ROCK GARDEN AND ALPINE PLANTS

By HENRY CORREVON

$6.00

ROCK GARDEN
AND
ALPINE PLANTS

By
HENRY CORREVON

Garden makers need no introduction to M. Correvon; he is known the world over as "the greatest living Alpine flower grower." His plants are grown in every country and he is the recipient of many horticultural honors, including the Gold Medal of the Royal Horticultural Society —the only award of this medal outside of England.

This book resulted from the many requests made of the author when he travelled over this country in 1926, visiting its gardens and lecturing under the auspices of the Garden Club of America.

"Rock Garden and Alpine Plants" is not a translation of any previously published book, but was written by the author directly in English. It combines his lifelong experience in growing Alpines with his first-hand knowledge of the needs and interests of American gardeners. Mr. Correvon's manuscript was edited especially for American conditions by Leonard Barron, a horticultural authority and lifelong friend of the author, who also contributes a foreword.

The book contains the most complete descriptive list of Alpine plants available. Besides the use and culture of these plants, it discusses ferns, orchids, and cacti, and rock gardens, wall gardens, and their other uses.

It will be of special interest to all garden makers, indispensable to nurserymen and other professional plantsmen, and important to botanists and students.

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ROCK GARDEN AND ALPINE PLANTS

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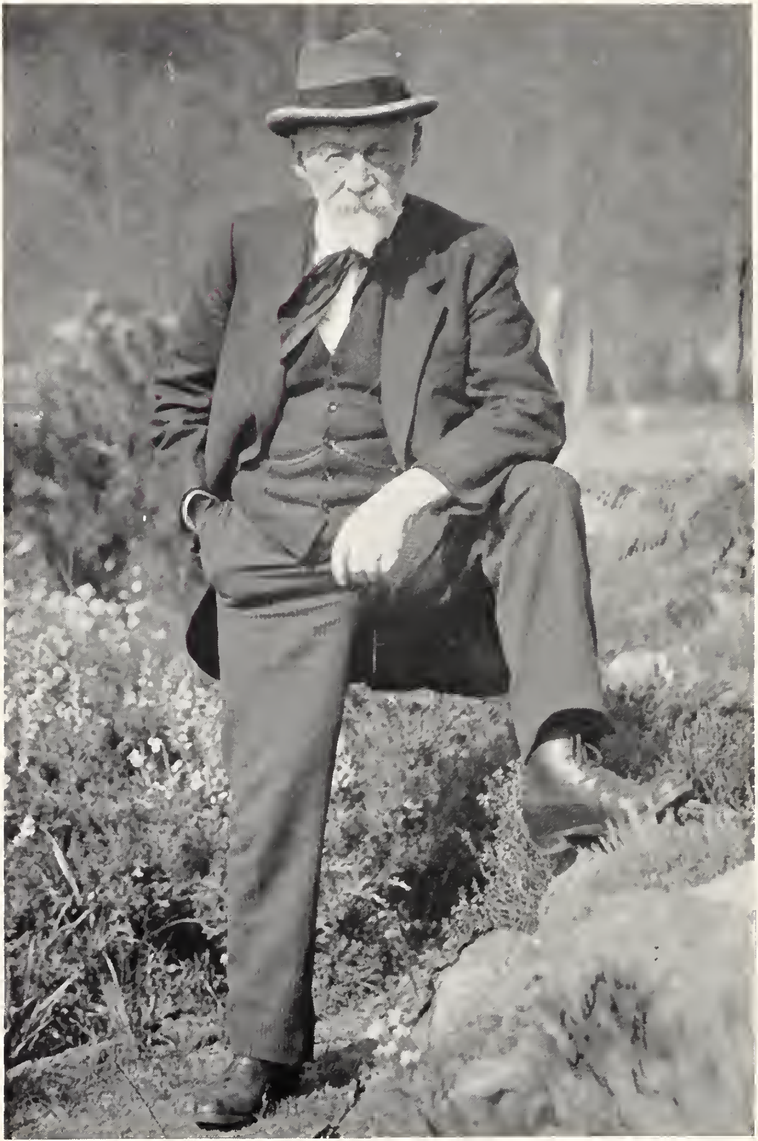

Photo by Bissell

Henry Correvon in the garden of Dr. Ralph Fenton, Portland, Oregon, March, 1926.

ROCK GARDEN AND ALPINE PLANTS

By

HENRY CORREVON

Edited by

LEONARD BARRON

New York
THE MACMILLAN COMPANY
1930

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Dedicated to
The Royal Horticultural Society of London
and
The Garden Club of America

12-31-75 To CC Gift (M. Averett)

FOREWORD

Years ago I had a small rock garden in my father's home. Even then I sought out the odd plants and welcomed the message that Mr. Correvon was delivering. So it has been really a labor of love to edit this culminating work of my old-time friend.

It is a fitting climax to an association that began, oh, so many years ago, when Mr. Correvon commenced his campaign to popularize alpine plants. It fell to my lot in those days, surely forty years ago, to be the first translator of his writings for publication in English, for at that time he wrote in French only. They were contributions to the *Gardeners' Chronicle* of London, with which I was associated at that time. It is not strange, then, that I should have been one of the very first to worship at the feet of the master. The germ that entered my soul at that time has never ceased to live and to expand. In a quiet way I have loved the rock garden not alone for its charmingly picturesque possibilities, but also for the fact that it offered in so unusual a manner opportunity for growing such a vast number of dainty, fascinating, and often puzzling plants. I have been tempted to refer to the rock garden as "the gardener's jewel box," for in it he places the rarest gems of the floral world.

Years ago when the first glimmerings of popularity for the rock garden came into being in America I was delighted almost beyond expression that this new phase of gardening interest was taking root in the New World. Rock gardening makes gardeners in the truest sense of the word, because so many of the plants require solicitous attention and often refuse to grow unless some very peculiar need is supplied. Yet for all that, rock gardening is not really difficult; it is simply interesting. The sense of personal achievement that comes to the gardener when he has at last triumphed over seemingly obscure problems, and when after it all he has finally succeeded in growing a plant that was otherwise recalcitrant, is something that must be experienced individually. It surely cannot be described.

I am particularly grateful that Mr. Correvon should have afforded me the opportunity to participate with him in a small degree in preparing this veritable dictionary of alpine plants. It was indeed with great delight that I was able, after a span of forty years, to renew practical acquaintance with the pioneer alpine gardener when he visited America a few years ago and so successfully preached the gospel of the alpine plant and rock garden from coast to coast.

At one time I had even contemplated translating into English some of Mr. Correvon's original writings. He had said in a letter, "You are the man." But he did it himself; for in the lapse of years since our first acquaintance he has acquired a very good knowledge of the English language and it is assuredly better that he should deliver his own message. And so the phrasing in the following pages is that of Mr. Correvon himself. I have merely tried to see that he conveyed—as far as possible in his own words, and certainly in his own way—the thoughts that he really meant to express. The text has not been rewritten, but merely edited for English idiom.

LEONARD BARRON.

April, 1930.

PREFACE

WHEN my first book, *Les Plantes des Alpes,* was published, in 1884, my friends of the Swiss Alpine Club, to whom it was dedicated, feared that it would be a fiasco, and some of them thought that it would have been better to have written a small pamphlet on the subject, not a large book. The work, however, was very well received, and sold out in fourteen months.

In 1877, when I first made the experiment of sending a collection of alpine plants to a horticultural show in Geneva, I was considered "a young enthusiast who did not realise the needs of the gardening world." Nowadays there is scarcely a garden in this country without its rock garden, and our Horticultural Society never organises a show without a section for alpine plants. Things have progressed rapidly in the city of de Saussure, de Candolle, Toepffer, Boissier, and Micheli, and interest in such things, in Geneva, is stimulated by many local alpine societies and scientific and other associations of all kinds.

What about other countries? In England, according to Paxton, alpine plants have been cultivated since the sixteenth century, and as everyone knows, the science of alpine culture has made great progress there. In the United States there is a large public interested in these matters, and interest in alpine plants and rock gardening is spreading fast. I have written this book for beginners, for those who want to be helped by an old hand, whose enthusiasm for alpine gardening has brought him health, joy, and happiness. These little jewels were scattered about the mountains of the world by the great Master and Teacher, to enlighten our lives and lead our thoughts to high altitudes, far from the ugliness of present-day civilisation, far from the grime of low-lying places, high to the heavens, where everything is pure and clear.

This is not a scientific nor yet an artistic book, but I hope that it will be welcomed by all alpine gardeners as a souvenir of an old friend who has found in the company of wild plants and in communion with Nature a great source of comfort during his long life. It will remind them also of the garden of Floraire, which so many of them have visited.

The book is not a translation of *Les Plantes des Montagnes et des Rochers,* as first announced. It is quite different from that work, and written specially for my English-speaking friends and for their special needs. I have included three chapters on special cultures: Hardy Ferns, Terrestrial Orchids, and Hardy Cacti. I was asked to include in the book some chapters of my last book on medicinal plants, and especially those treating of aromatic plants and plants which produce honey for bees, but this would have made the volume very large, and there is not so much general interest in such plants as in rock gardening. It seemed to me also that most of those who were interested in such matters would be able to read *Plantes et Santé* in the original.

I am glad here to take the opportunity of thanking my friends who have encouraged me to publish this book in English, and who have helped me by their advice and experience: in England, the Royal Horticultural Society, always ready to help everyone who loves plants, the Editor of the *Gardeners' Chronicle,* and Mrs. Alfred Hutton Radice, of *The Times;* in America, the Smithsonian Institution, Professors Coville, Wherry, and Rose, and David Fairchild of Washington, Mr. Richardson Wright of New York, Mrs. Francis King of Alma, Michigan, Dr. Fenton of Portland, Oregon, Mr. and Mrs. Davol and Mr. Gordon Abbott of Boston, Mr. G. Brooker of St. Louis, Mr. Hamblin of the Botanic Garden, Cambridge, Massachusetts, Mr. Stevenson of The Macmillan Company, and my old friend, Mr. Leonard Barron, now of New York, Horticultural Editor of the Doubleday, Doran publications, who translated my first writings for the English *Gardeners' Chronicle* in 1883.

HENRY CORREVON.

Geneva, January 1, 1930.

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ROCK GARDEN AND ALPINE PLANTS

CHAPTER I

ROCK GARDENING IN ENGLAND AND AMERICA

WHEN, fifty years ago, I spoke here in Geneva of the culture of alpine plants and of rock gardening, I was considered a foolish man, and people were sorry for me. I remember that, in 1877, being a young man and wishing to extend the culture of mountain plants, I ventured to make an exhibit of alpine plants grown from seeds before the Société d'Horticulture de Genève at a spring show. The judges and the Committee were surprised, and hesitated to accept mountain flowers in an exhibition of garden plants. They considered these wild plants as weeds; as one of them jocularly said: *Jardin alpin—herbe à lapins.* The judges were perplexed to know how to treat the small collection, and thought it was not worth acknowledgment; but one of them said: "Give him something in order to prove the interest which the Society shows in encouraging young beginners," and they gave me four little silver spoons!

But the day after, our most important paper, *Le Journal de Genève,* had a nice little note about my plants. The editor, who had been in Greece, recognising some Aubrietia, which he had seen in the land of Pericles, appreciated this small attempt of mine to acclimatise rock plants and alpines, and was kind enough to praise it. How rapid was the success that followed, everyone may see who has visited our Swiss gardens since that time.

In England things are different. James Backhouse was beginning, long before the time of which I have written, to acclimatise, in his splendid nursery at York, mountain plants from Europe and from other continents, and had published a catalogue of alpine plants. Mr. William Robinson, also, did a great work in popularising natural gardening and the cultivation of alpines. Certainly in England flowers and the love of gardening are better understood than on this side of the Channel. Making this remark once to Lord Avebury (then Sir John Lubbock) I got this answer: that the less Nature does for the pleasure of man, the more he works for the embellishment of his life. It is certain—though it may be paradoxical—that it is in the worst climates and in the dullest countries that flowers are best cultivated. I have visited a great part of Europe and of the United States of America, and I may say that it is in the English-speaking countries that I have found the best comprehension of horticulture, and often the best gardens.

The English owner of land, before calling for a garden maker, knows exactly what he intends to do and what kind of a garden he wishes to have. If he is a lover of trees he lays out a park for them and disposes everything for the trees' sake. If he likes shrubs he has his ground laid out accordingly, and, like Colonel Stephenson Clarke at Cuckfield or the

Hon. Vicary Gibbs at Elstree, the late H. Chambers at Haslemere, and many others, makes of his shrubbery a sanctuary for the rarest shrubs of the world. If he is a lover of nature and of the picturesque he works in that direction, disregarding the conventions of gardening and creating garden landscapes which often are real marvels. See what the late Lord Redesdale achieved at Batsford, Sir E. Loder at Leonardslee, the Hon. Charles Ellis at Frensham Hall.

Those who prefer the classical type of garden can find in England many magnificent creations of that kind. From the pictures in *Country Life* and other periodicals we know of hundreds of splendid gardens, which can be compared to the best of the Italian Renaissance.[1]

To those who prefer the natural and even the wild garden, no country in the world offers such a mass of splendour as England. Since and even before William Robinson preached the natural garden style, the greatest efforts have been made in England to introduce Nature in the garden. Miss Jekyll in her wood at Munstead, Lord Henry Bentinck at Underley Hall, Miss Willmott at Warley, the late Sir Frank Crisp at Henley, Frederick Hanbury at Brockhurst, Gerald Loder at Wakehurst, the late Sir Frederick Mirrielees at Dorking, and a great many others, have made with rocks, water, trees, shrubs, and plants splendid gardens, to which none of ours on the Continent can be compared. Those which might rival them belong to English people. See La Mortola and many others.

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[1] See the beautiful album, *Gardens Oid and New,* published by *Country Life,* London, Eng.

When I made my first visit to England in 1885 I was for some days the guest of my late friend, Mr. G. F. Wilson, the founder of Wisley, at Weybridge. He felt it his duty to bring the little Swiss into contact with English garden life, and he took me all over England to introduce me to those who best loved plants in England. We went to see the Rev. Wolley Dod at Malpas, Canon Ellacombe at Bitton, H. T. Elwes at Colsbourne, the Rev. Ewbank at Ryde, Sir Joseph Hooker at Kew, etc. My first impression, in the company of these friends of plants, was that their love for Nature gave them an eternal youth. Love of flowers and of gardening gives us vitality, this is certain. To work in the garden is the best remedy for age and melancholy, and no man who is a real enthusiast of Nature turns old; he enjoys life till the end.

Speaking of Canon Ellacombe, I see before my eyes the good old face of that man, born in 1822, who, being over ninety, still planted shrubs and trees. The last time he came here to Switzerland was in 1907, in his eighty-fifth year, and he enjoyed his trip like a young man. His garden at Bitton was a real museum of rarities, and I have never met a man who was more liberal of his treasures.[2] Dr. A. W. Hill says of him in his biography:

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[2] Except perhaps Mr. Bowles. When I was at Middleton House he gave me a big basket, took a trowel and, when I admired a plant which I did not possess, he dug it out and put it in the basket.

> I imagine that Ellacombe knew nothing and cared nothing about the architectural aspect of a garden, its artistic relation to the house and the whole philosophy and practice which we sum up as "formal gardening." To him a garden was a home for flower, shrub, and tree, a place of hospitality for plants, but not a work of art in its own right; this goes to show that there are many sorts of gardeners and gardening, and all of them combine to make the complete story of the old pursuit and pleasure of mankind.

And again:

> No one had more sympathy than Ellacombe with the desire to let Nature in at the gate and banish the shams and "artistic" monstrosities with which the "landscape artists" and gardeners of the Victorian era cozened their patrons, and Bitton is a good example of trees, shrubs, and plants, forming a picture as satisfying to the eye as it is to the needs of the practical gardener.

The English clergy seem to have been particularly devoted to the culture of plants, at least in the last century, and the richest collections were to be found in vicarage gardens. Then, leaping the walls or hedges of these gardens, the love for gardening went out into the whole parish and into the cottages, everyone being stimulated and taught by the vicar's example.

Gardening is really the secret of a healthy and pleasant life, and I know no happier men than those who are interested in their gardens. I think I have met more gardeners in my life than many of my readers, and I am certain that none of them, or at least very few, in spite of the difficulties and sorrows which everyone must know in this world, could be considered as unhappy. Gardening is a school of patience, of resistance, and cheerfulness.

And now it seems that rock gardening is a special subject of notice in that direction. There is nowadays, all over the world, but especially in English-speaking countries, a real enthusiasm for mountain and wild flowers and for the cultivation of plants among rocks. An American medical review recently had an important note from the pen of a professor of medicine in the University of Michigan which is an eloquent encouragement for alpine gardeners. Here are some lines from it:

> The building of the rock garden in itself makes demands upon special faculties. A knowledge of the primary laws governing the growth of rock plants as to their individual soil preferences—calcophiles or calcophobes—is necessary; to the arrangement of soil and rocks with reference to drainage and æsthetic effects is an art of no mean value; and above all the ability to make plants look natural and happy in an artificial reproduction of their environment may be either inborn or ultimately acquired after much experience of trial and failure. With some individuals it is primal instinct. The collection of new varieties means an increased interest in botany and floriculture, and in the geographical distribution of plants. As one grows in grace and in knowledge the creative desire develops, and the rock gardener turns to thrilling possibilities of selection and hybridisation. A new passion is born out of the old, and the remaining years of life are all too few for the sowing of seeds produced by crossing and the determination of the results. And should a worthy new variety result—well, it is a victory worth a whole lifetime of effort. In this ultimate phase of the sport of gardening the highest thrills of a gambling game may be experienced. Finally, the literature of rock gardening offers an abundant library, for winter and in-bed reading. The stories of plant collecting in the distant and out-of-the-way places of the world are as thrilling to the rock gardener as big game stories to the hunter.

Perhaps an explanation of the perennial youth of the man who preaches the culture of alpine plants can be found in his lifelong interest in alpine gardening. There are many other accounts of individual experiences in rock gardening that may be added to this literature on the subject, but they will ultimately be discovered by the adventurer in this field. We have mentioned rock gardening first in our contemplated category of recreations for physicians, because it seems to us to combine all the essential features of a perfect hobby; its satisfaction to the creative and inquiring mind, the pursuit of scientific knowledge, æsthetic appreciation, contact with the soil, physical exercise, life in the open, travel and literary appreciation. These interests, so manifold and varied, constitute a field so limitless in extent that all of the spare time of one's whole life might be expended in it without any possibility of exhausting its possibilities. Its cerebral stimuli are so different from those of the practice of medicine that frequent reaction to them, if only for a relatively short time, leads to that more perfect mental catharsis which is the aim of all forms of recreation.[3]

The widespread enthusiasm for alpines which I found during my recent visit to the United States surprised and delighted me. All over North America and Canada there is a great development of natural gardening. The wonderful American women are at the head of the movement, and some of them are the best gardeners I have ever seen. They have an association called the Garden Club which, like an immense net, covers the country. Sections of this Garden Club can be found in every state and in the principal towns. Its objects are to stimulate the knowledge and the love of gardening among amateurs, to share the advantages of association through conference and correspondence in the country and abroad; to aid in the protection of native plants and birds; and to encourage planting.

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[3] *Annals of Clinical Medicine,* Baltimore, September, 1926.

I met, in every one of the thirty-six towns where I was invited to lecture, a warm and sympathetic reception from the ladies who were at the head of the local Garden Club. I could not but admire them in their love for Nature and for gardening. I was amazed to see the zeal they displayed in order to hear the message brought from the modest Swiss country by a modest son of Geneva. And always and everywhere I found the women first at work, asking for information, taking interest in all the questions treated. Never, in my already long life, had I found such keen enthusiasm. Their gardens seem to be dearer to them than their parlours (this is seldom the case on our Continent) and I saw not only young wives but often old ladies working hard in their rockeries and putting their great interest into them. And I saw this all over the land, from Boston and New York to San Diego in California, from Richmond, Virginia, and Philadelphia to Seattle on the Pacific Coast. Everywhere the women are at work. We have in French an old proverb saying that "what women will God wills," and I am certain that in America the women will develop garden love to its best.

I spoke at Seattle of the disagreeable impression made upon my mind, as a member of the Committee for Public Arts in Geneva, by the awful electric poles and the billboards; ugliness spoiling one of the most beautiful views I had ever seen—the lakes, the forests, and Mount Rainier as background. The women said: "We are here and will work to have things altered," and I know they will do it. Women invited me to the United States, and women were my mentors there; they organised and managed the long and difficult journey through twenty different states where I had to give thirty-eight lectures. And all this was organised so perfectly that I had not one difficulty during four months of travelling.

American women love their gardens, they love nature, and they work themselves, with or without a gardener. An old friend of mine, who is the daughter of the famous Swiss professor, Agassiz, founder of Harvard Museum, was the first who, in Boston forty-five years ago, began to acclimatise alpine Rhododendrons, Gentians, and Edelweiss. Her neighbours followed, and soon, here and there in Massachusetts, could be seen rock and alpine gardens. At that time it was still possible to send over to the United States living alpine plants. Now it is almost impossible to do so, as there is an army of functionaries at Washington watching for the salubrity of the country![4]

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[4] A typical example of this method of protection: We had last year to send to an amateur in Boston three plants of the new double yellow Pæonia, "Prof. Cornu," which he greatly wanted. He got permission from Washington, we sent him the three precious roots, but had them soon after returned from Washington as being infected by a fungus. As we had never had anything of the sort at Floraire we immediately sent these roots to the bacteriological office of our University, and the answer was that the roots were free of any pest and perfectly healthy! May American amateurs obtain the right we have here in Switzerland to introduce what plants we wish for our gardens. We get here all the plants we wish

In England gardening has been for many centuries considered as an art and a science, as well as an amusement, and the aristocracy take the greatest interest in planting their gardens. Since the year 1804 the Royal Horticultural Society of London has been a centre of activity and of instruction for the people. Such a society is a real power in a nation. It works all through the year by its council, its committees, its meetings, by the organisation of fortnightly exhibitions in its own hall, and of big shows twice a year at Chelsea and until recently at Holland Park. It possesses an experimental garden at Wisley with a school of gardening for young students and a wonderfully rich library open to the Fellows; and it publishes many big works, such as the *Botanical Magazine, Iconum Botanicarum Index,* and interesting and useful reports. The distribution of plants and seeds to Fellows and the organisation of trials at Wisley are some of the very important manifestations of its activity. An imposing Scientific Committee examines questions of pathological, biological, and scientific interest. There is a committee for the examination of new introductions, and for making awards to plants of merit. There is a committee for fruits and vegetables, one for flowers, and special groups for Narcissi, Dahlias, Tulips, Iris, Sweet Peas, Orchids, etc. No wonder that in a country blessed with such a Society (the number of whose

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from the United States (the land which sent us the phylloxera!), and so we have good collections of plants, and no more pests than the Americans.

Fellows is around 25,000), whose influence goes all over the world, the love and knowledge of flowers and gardening exceeds that of all other nations.

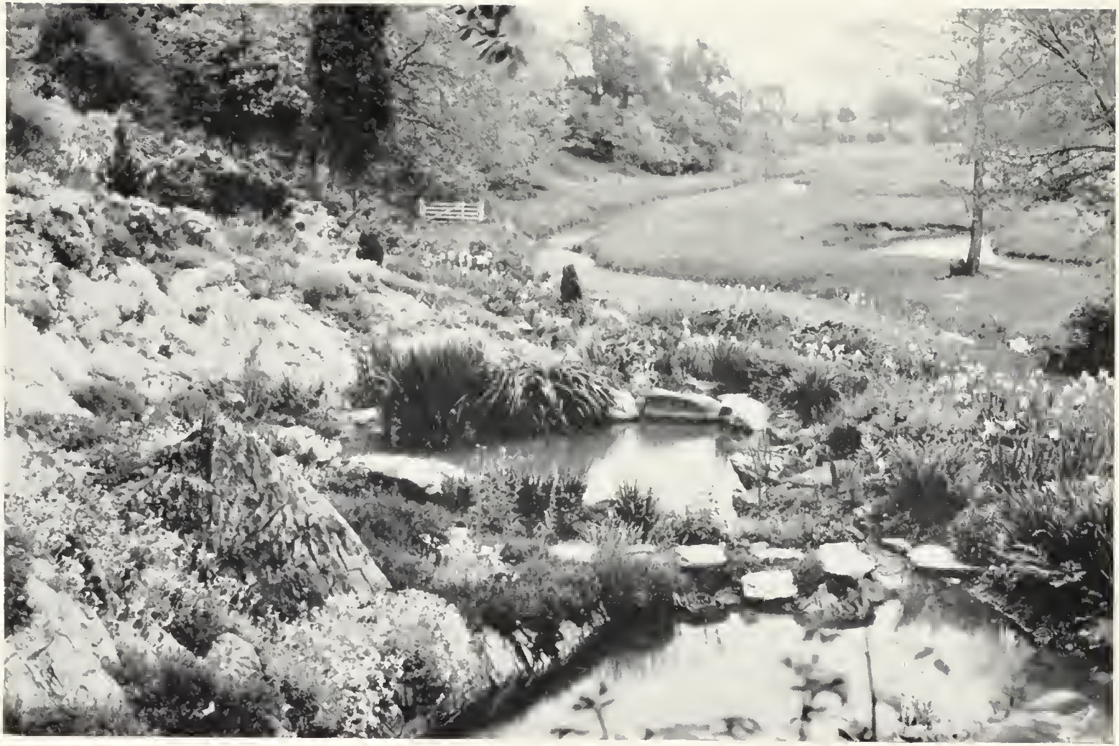
In the United States things are less advanced, but the gardening world has at its disposition splendid libraries, many horticultural societies (some specially for Orchids, for Roses, for Ferns, for Gladioli, and for Iris) and the Garden Clubs I mentioned before. The Arnold Arboretum, at Jamaica Plain, near Boston, is a marvel; I visited this collection twice, in winter and in the spring, and cannot express in words my enthusiasm for the work of my late friend, Professor Sargent. I do not believe there is one shrub or tree capable of standing the climate which is missing from the growing collections there; and the plantations are well arranged and distributed. The æsthetic point of view has been well studied, and I have not seen in the world such an artistic collection of documents on arboriculture and dendrology. The disposition of types and the good order of the garden approach perfection.

Other very interesting things which I saw while in Boston—indicating the love of flowers in New England—were the "glass flowers." I was surprised that it should be possible to imitate and reproduce with such exactitude the thinnest organs, the most delicate details which Nature gave the plants! At first sight I could not believe that the flowers were artificial, so near were they to reality. They come from Europe, and the artist is a Bohemian.

Alpine gardening is at its beginning in the United

States, but those who know American strength and energy do not doubt that we shall soon be surpassed. In New England the climate is hard and severe, and gardening is not easy. Conditions are better for alpines and perennials than for ordinary culture; deep snow in winter is suitable for our plants, although the hot and dry summers are rather prejudicial. But if the rocks are porous (limestone is very good for this) they help to keep moisture and to balance things. The soil in New England is generally acid, which is an advantage for many plants which we cannot grow here in our calcareous soil. Rocks are easy to get, having been brought down in old times from arctic regions by glaciers; these rocks are varied and in some cases very effective in appearance (granites, porphyries, serpentines, schists, gneiss, and limestone).

In Paoli, twenty miles from Philadelphia, I saw a very curious and beautiful alpine garden on a natural outcrop of rocks rising above a stream of pure water in a fine landscape. I had come from famous Valley Forge, dear to true Americans in that land of the old Puritans, and Mr. Haughton, a descendant of the heroes whose statues we saw there, drove me through green meadows enamelled with the sky-blue flowers of the dear little Houstonia, to his summer seat near the old mill of Paoli. In that picturesque setting the lady of the house had made herself, with the energy of an American woman, a large and original alpine garden. When I was there it was an enchanting sight with masses of *Daphne*



"In Paoli, twenty miles from Philadelphia, I saw a very curious and beautiful alpine garden on a natural outcrop of rocks rising above a stream of pure water in a fine landscape."

cneorum (garland flower), dwarf Phlox, Viola, Aubrietia, Saxifraga, dwarf Iris, Dianthus, Primula, Androsace, etc., which flowered there as well and even better than here at Floraire, the river bringing to them a constant atmospheric moisture. The extra rocks added were in harmony with the natural rock, and the picture was entirely harmonious.

A few miles from New York there is a dear little suburban town called Bronxville; there I visited two small gardens of wild flowers exceedingly interesting to a botanist. They were those of two authors well known in the alpine gardening world: Mrs. Louise B. Wilder and Mr. Herbert Durand, whose notes in *House and Garden* are much appreciated. Under the shade of gigantic Tulip trees these two amateurs, not one mile distant from each other, have fine collections of North American wild plants, and I lived there delightful hours with them. Another rock garden of great reputation is that of Mr. Clarence Lowne at Poughkeepsie, seventy-six miles from New York, where one may see a magnificent collection of alpine plants. In Groton, Massachusetts, the Lowthorpe School of Horticulture gives special instruction in alpine gardening, and raises alpine plants from seed with great success; a neighbour of the school, the dear horticulturist, Mr. Huebner, whose garden lies in the midst of woods possessing a rich flora, has a fine collection of wild types, too.

I did not see Canada, but I know that there are all about that richly wooded country fine alpine gardens and good collections. The rock garden of Mr. J. C.

Morgan at Montreal is famed all over the world (see *House and Garden,* February, 1928) and the collection of Mr. H. Norton at Ayers Cliff is of great interest.

In northern districts and the Great Lakes countries the rock garden must be recommended as one of the best types of artistic gardening. The damp atmosphere is very suitable for alpine flora, and there are in Detroit, Cleveland, and Rochester some beautiful examples of alpine gardening.

Good alpine nurseries are there, too; Wolcott's Nursery at Jackson, Michigan, for rare plants (founded fifteen years ago), and the Wayside Gardens at Mentor, Ohio. These produce alpine and mountain plants by the thousand. In every state there constantly arise new nurseries devoted to alpine plants and rock gardening. Such nurseries as those of Mr. Gillett at Southwick, Massachusetts, and Horsford at Charlotte, Vermont, have been known for many years for the supply of rare American wild plants which they send all over the world without any obstacle as to importation into other countries. The dear terrestrial Orchids and the rare Ferns which I get from them are one of the enjoyments of my life. I must mention also my friend C. Purdy at Ukiah, California, whose nursery is one of the most interesting that can be visited. There in the wildness of mountain landscape, near the splendid Redwood forest, in the midst of the richest flora I ever saw, he grows Californian and Rocky Mountain plants to send to the five continents.

In Colorado I have seen a beautiful rock garden made of the red and bright-coloured stones which gave the name to that coloured country; this was made by Mr. Roberts, a garden architect at Denver. And not far away lies the university town of Boulder, with the good nursery of Mr. Andrews, who acclimatises some of the most interesting wild flowers, especially the *Aquilegia cærulea,* called the Colorado flower.

To the Pacific Coast I went as to Paradise, and made a real pilgrimage. Portland, Tacoma, and Seattle are something which is only surpassed by California; from a rock gardening point of view, however, there are advantages in the North, as the climate of Oregon and Washington is more suitable for alpines. When I arrived at Seattle I had the same impression I had the first time I went to our Italian Switzerland (Locarno-Lugano). At the end of March I found the gardens in their glory, and the atmosphere full of sweet and delicious fragrance. As Bacon says: "In the Royal organisation of Gardens there ought to be Gardens for all months of the year in which severally things of beauty may be in season." This is the case in that blessed country.

In these young towns (Seattle, the great and rich town, is two years older than I am myself) the streets are broad and clear, adorned with fine houses of different styles of architecture, every one framed in a garden of special character, revealing the taste of the owner. The low walls which support the terraces are made of dry stones, generally not cemented, and would make splendid wall gardens if soil or sphagnum were introduced in their crevices. In that exquisite climate, gardens are marvellous; some of them might be considered as beautiful pictures in the best frame possible, if once the electric poles and awful billboards were taken away. At the time I was there the Camellias, the Azaleas, the Laurustinus, the *Daphne odora,* the *Skimmia,* and many other sweet-smelling shrubs were in beauty. In the garden of the Villa Merrill the brightest colours were beginning to illuminate the scene. But nothing is more interesting than the rock garden of Dr. Tenny near the town, facing the beautiful Mount Rainier, which, like our Jungfrau at Interlaken, rises majestically above the country and dominates the beautiful lake and gulfs. In this garden I saw a collection of our alpine flowers, the Pyrenæan Saxifrage, and our Gentians, all our treasures fraternising with the children of the Rocky Mountains, and all together protected by the most beautiful Californian or Northwest trees. At a time when there were in Boston and New York three feet of snow we went to visit a beautiful forest garden above Seattle where I saw the *Linnæa canadensis,* the dwarfest of the shrubs, creeping under the highest spruces (*Abies douglasi*) and we could pick the yellow Viola (*V. sempervirens*) and many other wild spring flowers.

Tacoma and Portland are two big towns which merit the name of terrestrial paradise. Like the gardens at Seattle, those at Tacoma and Portland are of individual character, every one different from the others, none of them submitting to a general rule and each reflecting the taste of its maker. Some are real arboreta for trees and shrubs, others are devoted to bulbs and wild plants. I saw many gardens of great artistic aspect, combined with the surrounding landscape and forming an harmonious picture with it. As in England, some people are beginning to have real collections of rarities, and many rock gardens have already been formed which are really good. I was taken for a drive on Mount Rainier, 14,408 feet in altitude, as far as it was possible. A deep mantle of snow still covered half the mountain. There I saw a beautiful location for an alpine garden, if ever the Mount Rainier Club decides to make one. There is a naturalist there whose special business is the study and the protection of Nature in the Reservation; he publishes an illustrated paper distributed to the public in order to stimulate interest in natural history.

Portland is one of those cities where one would like to spend one's life between flowers and natural beauties. Lying at the base of Mount Hood, and seated on both sides of the majestic Columbia River, it is called the "City of Roses" because all along the streets there are long beds of roses which in May and June give the whole town a special character of brightness and splendour. Dr. Fenton and his friend, Dr. Benson, both have rock gardens with interesting collections of alpines; they drove me about the country, botanising. It was a happy day when I picked the marvellous Avalanche Lily (*Erythronium montanum* and *parviflorum*), the

Shooting Stars (*Dodecatheon vulgare* and *dentatum*), the dwarf American Androsace (*Douglasia lævigata*), the dear little *Calypso borealis,* the splendid yellow *Lysichitum Kamtschatense* which adorns all the marshes (my friends do not appreciate it and call it "skunk cabbage"), the delicious *Trillium grandiflorum,* the very showy flower of a big yellow Daisy, a kind of gigantic Arnica (*Wyethia angustifolia*), the delicate *Romanzofia sitchensis,* the *Pentstemon rupicola,* and hundreds of other plants which I had only seen in captivity before. Magnificent above all were the slopes above Mosier, blood red with thousands of bushes of Red Currant, *Ribes sanguinea.* These recollections can never go out of my mind as artist and botanist. They are things no thinking and feeling man can forget.

California is a different country and, having a different climate, presents other marvels. Is it really the garden of America? I think it is, but there we can hardly speak of alpine gardening. Gardening is easy, and nobody seems to escape the task of brightening the landscape. Luxuriant, brilliant, and fragrant are the gardens in their splendid natural setting. The entrance is gold and azure; as soon as Mount Shasta is behind and one enters the Sacramento Valley the railway runs through a field of California Poppies (*Eschscholtzia californica*) of the brightest orange, enriched by sumptuous colonies of blue Lupines, the whole being framed by big plantations of Eucalyptus or splendid woods of *Oreodaphne* (*Umbellularia*) *californica* (Californian

Laurel) the aromatic fragrance of which incenses the atmosphere.

Nature has lavished on that country its best treasures, and it is not hard work for man to create brilliant gardens. I saw all over California the most wonderful gardens; all new, of course, but some of them having reached such a development that they surpassed some of the best old Mediterranean gardens. In Berkeley, where I stayed in the very comfortable house of Mr. Hanson Blake, which is only five or six years old, I found a rich botanic collection, and an artistic garden, which I dare say will in a few years be comparable to La Mortola. The avenue leading to it was flaming with the blood-red flowers of *Eucalyptus ficifolia.* Burlingame, the Versailles of San Francisco, is a blessed country for gardening; it is hidden in a forest of Eucalyptus, and gardening is carried on there by many wealthy women of good taste and artistic mind. Santa Barbara and San Diego are full of splendid gardens framing rich villas in the Spanish style.

Generally speaking, the only means of succeeding with mountain plants in California is the rock garden and, still better, the wall garden. I saw here and there some very good specimens, and thanks to the proximity of the ocean, which moistens the air, some alpines can stand the hot summers of that country.

CHAPTER II

PLANTS IN THE MOUNTAINS

Flowers are the sunshine of Life.—FARDEL.

THE vegetation which clothes the upper slopes of mountains, whether in Europe or in the four other continents, has a character of its own which strikes at first sight even the most unobservant of tourists. The stems of the plants are generally short, the body of the plant compact and dwarfed, and the flowers seem to develop themselves to a much greater size, in comparison with the plant, than elsewhere.

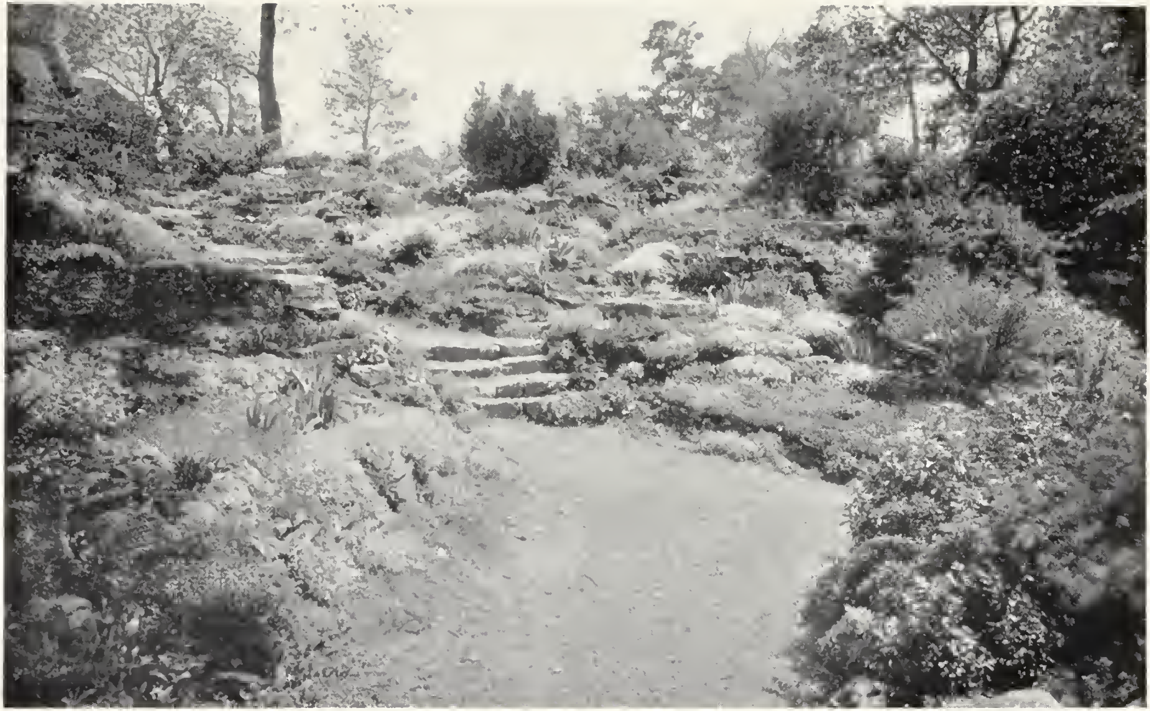
In our valley regions the large plants develop their foliage with branches erect and spreading, bearing flowers often smaller than the leaves, but up there all is changed. The stems are almost gone. The flowers are relatively large, the foliage is scarcely apparent, little developed, and often hairy, especially at great altitudes where a sort of down is necessary to protect the cells of the plant against the heat of the day as well as against the cold of the night. Sometimes the leaves are smooth and glossy, and their leathery texture is a means of protection against the hoarfrost. Other plants have leaves which are tough and thick and furnished with a solid covering, a sort of waxy coating, which enables them to resist the withering effect of the sun's rays as well as the excess of humidity.

The species which grow in cool, shady places show none of these characteristics; their corresponding organs are instead soft and delicate.

We meet many downy-coated species on dry and arid slopes, exposed to the blighting winds and the heat of the sun (as the Edelweiss, or Star of the Glacier, the various Senecios, the Artemisias, the Achilleas, etc.). We also find there species free of down or hairs, such as Azaleas, which climb all over the Alps, the *Rhododendron ferrugineum,* the various encrusted Saxifrages, the Gentians, etc., the leaves of which are generally hard, thick, and glossy. If we search in cool and shady places, on the contrary, we find the Ferns, the Lycopodiums, the viscous Primroses, the delicate and finely cut Saxifrages, a whole flora with soft leaves. Another contrast easy to observe is that in the sun the corollas of the flowers of the Alps grow to a great size. The colours are bright and dazzling while, on the contrary, in the shade the flowers are more often small and inconspicuous as to colour. The influence of the sun seems then to be more intense in high altitudes than elsewhere.

Annual plants, so abundant in the vegetation of our plains, are almost entirely missing above the snow line. Up there the short summer does not allow these plants to accomplish in one season the complete cycle of their existence. The only species which are not perennials are some Euphrasias, some Louseworts, and one or two Gentians. Everywhere one sees perennial plants with offshoots branching at the base and spreading on the ground, from which they seem to seek protection against the chill of the cold nights and the stormy days, which are numerous even during the short summer of the high mountains.

Plants which in our lowlands form shrubs, or even grow to be majestic trees, are represented there by dwarf or creeping varieties, hardly more than a few inches high. The Willows, the alpine Azalea, the Arbutus, the dwarf Birch are among this number. Between the stones and in the crevices and fissures of the rocks dwell these close-shaven plants, having the appearance of dense pincushions, or of hemispheres formed of a great number of little rosettes pressed one against another, covered with a profusion of sessile blossoms and crowded together adorning the surface of the plant like embroidery, so that one sees the foliage as if through a veil of delicate bloom, sometimes of dazzling hue. The leaves overlap each other like tiles, one over the other, very small and interesting. These dwarf compact clumps produce a wonderful effect. They gleam upon the rocky slopes like jewels and give them an enchanting appearance. Upon the high summits of our Alps, on the rocky ridges of the highest mountains, we can see, side by side, the most perfect jewels of the mountain flora, radiant as stars upon the frozen, rocky ground. They form there a mosaic or carpet of the brightest colours, the effect of which no painter can convey.



Courtesy, House and Garden

The central ravine in the rock garden of F. Cleveland Morgan near Montreal, Canada.

The dwarf *Eritrichium nanum* grows in our high altitudes, as well as on mountain heights of North America, painting the rocks a heavenly azure, a deep and delightful blue which thrills and charms, a special blue which belongs to this flower alone. It is not only a Myosotis, it is a jewel; its closely set flowers, quite without stem, are laid against one another so closely that the whole mass seems like a stroke of the brush in a beautiful picture. By its side is spread the glacial Androsace, which is of as tender a pink as the Myosotis is blue, and is also dwarfed and closely shaven, presenting to the sun its mass of stemless flowers, compact and embedded in the clump. The colour is pale or deep; it varies from pure white to the most vivid pink.

Then there is the pale yellow sulphur tint in the petals of the charming *Saxifraga stenopetala,* one of the most charming of alpine plants. Farther away is the carmine of the Saxifrage with opposite leaves, the red blood of the *Saxifraga biflora;* then other shades and other colours as we continue to admire this wonderful carpet. Always the flowers are without stems, closely attached to the surface of the plant upon which they embroider their blossoms. This sight alone is worth a pilgrimage to the high peaks. It is indeed there that we may say *"Terrestria sidera flores."* In mountain vegetation all the energy of the plant is concentrated upon the flowers and consequently upon the organs of reproduction. We can easily understand this flora when we observe the conditions under which it lives and develops; that it might take the plant several years to accomplish the cycle of its existence, and that it must in one summer have both flowers and seed.

When one considers the enormous difference between the climate of the high altitudes and that of the lowlands, there is no difficulty in understanding why the vegetation up there is so different. While in the lowlands the plants pass from a damp winter, comparatively mild and not of long duration, through the stages of spring to a warm and dry summer, which allows the slow and gradual development of leaves and stems, all is very different above the snow line. To a very long winter which often lasts nine months, sometimes even several years (for there are some deep valleys which may remain under the snow for a period of several years), there succeeds, all in a flash, a short summer, but one extremely favourable to plant growth. Light, heat, and moisture are prodigally lavished on the plant, which then after a long period of rest enters at once into the full glory of the long days of summer without having to pass through the spring.

At the breath of the southwest wind, of the "sirocco" or of other warm breezes by which each chain of mountains is visited, the snow disappears, the brown carpet of the world changes, and in a few days, sometimes in a few hours, it takes on an emerald tint. As if by magic all the world wakes, lives, grows, and bursts into bloom. On every hand the busy insects fly, powerful allies of fertilisation without which many varieties would be doomed to sterility.

Some plants are then so ardent in their desire to unfold their corollas that they cannot await the moment of the final melting, and push through the bed of snow which their stems, thanks to their dark tint, have had the power to pierce. We have often seen this phenomenon among the Soldanellas and the Crocuses in the Alps or on the Jura.

One might ask how this can be possible since, during eight or nine months, the plant has slept under its mantle. To this statement, which is not exact but which is generally admitted, we reply that the plant does not pass the winter in a state of perfect repose. Life continues to flow in its veins. The sap is moving there, though but slowly, and the plant begins to grow.

Do you wish for a proof? I noticed some years ago on one of the eastern slopes of the Jura a clump of Soldanellas just at the moment when they were about to be overtaken by the winter. This was at the end of October and the next day the snow fell and remained upon the ground for six consecutive months. At the moment when I made this observation the plant had ripened its seeds and the sap within it lay dormant, withdrawn into the roots. Not a bud was in the centre of the clump; it appeared to be at the point of exhaustion. In the early days of spring I returned to the spot, lifted the snow with an ice axe, and found the same plant, which I had marked in the autumn, carrying some buds in the heart of the clump, though they were very small at that time. It had formed these buds during the winter under its covering of snow just as our forest trees enlarge their buds during the winter. Though the cold be extreme, one may see them increase in size each week. Life is not then reduced to a state so latent as it is generally believed to be; the fact of the Soldanella and the Crocus flowering while pushing through a bed of snow is proof most positive.

The energies of all the roots in these plants of the high Alps are devoted firstly to the flower and the organs of reproduction; the development of the leaves, which contain the organs of respiration, being generally postponed to the end of the season during and after the ripening of the seeds. After the long repose of winter (a comparative repose, as we have seen) the plant embarks upon a period of prodigious activity. The days have fourteen, sometimes sixteen consecutive hours of light, clear and strong. The sun is more powerful than with us. There is abundant water, either in liquid form or in the form of dews and mists. Light, heat, moisture all abound and a profusion of roots and rootlets work incessantly.

Let us now look into the obstacles, the causes which keep the plants close to the ground and dwarf them.

The fact is well established that it is during the night that plants grow and expand their tissues. Their growth by day is in inverse ratio to the power of the sun. But the alpine nights being frosty, nocturnal growth is out of the question for the plants of the high Alps. It is only in the brief summer twilight that they can grow and develop. That accounts for the shortened internodes and for the general stunted character of stems and branches. The great heat and strength of the sun in our high altitudes stimulates the formation, the enlargement, and the vivid colour of the flowers. It hinders the development of stems and of leaves. These organs have for growth only the brief period between the setting of the sun and the cold night. The plant makes up this loss in the latter part of the season in those warm and cloudy days which precede the arrival of winter, and it takes advantage of them to put out new leaves and new shoots. This is also true of the flora of the arctic regions, which includes a great number of varieties similar to those of our Alps. The light of the sun is even more constant there, more constant since it lasts only half the year. It is also more diffuse because the rays of the sun are less direct, and the atmosphere is much heavier than ours. There also the stems are longer, the colours less vivid, the leaves more tender, the flowers smaller. We have in our garden some specimens of arctic origin and others of alpine origin of species which are common to the two regions. The same variety of plant clothes itself in quite different form according to whether it grows on the Alps or in the frigid zones. There is, for example, the *Silene acaulis* which is stemless on our Alps, while in Lapland it is quite different; its flowers are smaller and are carried on stems eight to ten centimetres in height.

There are, however, other reasons which explain the compression of the forms among plants of high altitudes. The storms and the winds, which are of great violence up there, would break any stem which lifted itself above the ground. The radiation of the frosty nights also forces the plant to seek a shelter near the earth, its natural protector, which retains more heat than the air. When all the snow has disappeared, the heavy dews of the morning alone give to the plant the moisture it needs, moisture which the porous soil of the mountains absorbs. This again forces the plant to lean upon the ground for protection.

The ground in which the plants of the high mountains grow is different from that of our lowlands. In the crevices of the rocks, at the foot of the cliffs, in lonely ridges is found a humus, porous, black, rich in vegetable material and destitute of organic constituents. This earth is characteristic of the mountains and it is formed in a most interesting and remarkable way.

Let us climb together, if you will, to the summit of the limestone mountains which are in the neighbourhood of Geneva: the Vergys in Savoy, for example. There we find great blocks of fallen stone or crevices seamed and worn by the action of water and the weather. These crevices, more or less marked, run in every direction. In many places they become so deep that they split the rocks in two.

In all these openings we find a vegetable growth perfectly established and more or less varied. While in the more recent fissures we find only Lichens, some Mosses, or other cryptogams, the oldest ones give a resting place to higher types and even to some kinds of trees. In the small cracks one does not yet see the earth. The Lichens establish themselves on the rocks, the moisture of which, together with their mineral constituents, suffices for their existence. Then come the Mosses, more highly organised and richer in tissue, which demand more nourishment than the Lichens. In the larger and older fissures, we see the phanerogams burying their roots rich in nourishing substance and in the largest cavities of all we find a blackish peaty humus which sustains the life of a great number of highly developed plants. This excellent black earth or humus increases each year, so we can understand how the vegetation advances and becomes widely distributed as time goes on.

Upon the granite and among volcanic rocks, things are quite different. There we find fewer fissures, fewer holes formed by water, fewer chinks and openings. The rock is broken in straight lines and forms little cornices with little outcroppings, hard and rugged, after the manner of small roofs, that protect special growth. A ceaseless work of erosion, quickened by freezing and thawing, by droughts and moisture, is carried on in the hardest rocks. First a block of rocks is detached, and goes to join in the valley the débris which has accumulated there for centuries. The wall from which it broke is absolutely bare and immaculate. It seems impossible that any plant could come to cling on it and live. Yet at the end of some years, perhaps half a century, if we could return to visit our rock, we should see it adorned with touches of different colours, its roughness appearing more or less green.

The spores of Lichens have been brought by the wind, and have been developed under the influence of moisture, and these Lichens have extended themselves and taken on more colours. They become thicker from year to year and gradually form a deeper and deeper bed which will eventually be transformed into light soil. Into this soil, one day or another, the seed of a plant more highly developed will come and begin to germinate, brought by one of the numerous means of scattering seeds which Nature employs: the wind, the rain, or the birds. As the plant increases in size, its leaves will decompose little by little. Its seeds will fall around it and they in their turn will germinate, and before long a colony of plants will animate the arid and one-time sterile rock.

It is in this manner that the alpine vegetation advances, and has everywhere installed itself, thanks to the presence of the Lichens which are the precursors and promoters of vegetable life. The Lichens, so varied and so numerous, have an important rôle in the economy of Nature.

CHAPTER III

ACCLIMATISATION AND CULTIVATION OF MOUNTAIN PLANTS

When I die may it be said of me that I always plucked a thistle and planted a flower where I thought a flower would grow.—ABRAHAM LINCOLN.

THE conditions of existence of our mountain flora are intense and unbroken sunshine, complete exposure, burning heat, the effects of which are lessened by cold nights and unfailing moisture permeating earth and air alike—all lavished with immediate generosity after the long winter rest is over. One can understand, therefore, that plants accustomed to such a climate find it hard to endure the far different conditions which our lowland gardens at the best can offer. Dry air, winters that are no winters for them, the feebler light with which we have to be content, our deadly summers and the long springtime of transition to and preparation for the sunlit days—all these are causes which modify, in their new environment, nature and organs alike.

With a little care it is possible to acclimatise almost all the mountain plants and to have them growing either in rockeries, in walls, in ordinary borders, in peat beds, in moraine, or in the new kind of glass house which has been adopted at Kew and called the "alpine house."

For many years mountain vegetation was reputed to be impossible of acclimatisation. That, of course, was not true; today almost every alpine species has been brought into cultivation, both in Switzerland and in England, where horticulture has reached an excellence unimagined elsewhere. In France, Austria, Germany, throughout the temperate zone, the culture of alpines has attained to a popularity that grows from day to day, and there is scarcely a country outside the tropics into which the flora of the snow line have not been introduced. The alpine garden of acclimatisation, which, founded in 1884 at Geneva, has spread the fashion through the five continents, and our nursery at Floraire now send plants and seeds all over the world.

From about the time of the sixteenth century onwards, English botanists and gardeners introduced across the Channel *Gentiana lutea* and *acaulis,* and varieties of *Primula Auricula,*[1] together with several other alpine species, but it was not until the second half of the nineteenth century that these plants became enfranchised citizens of the horticultural world, and that nursery gardens were started which specialised in the acclimatisation and sale of alpine plants. In England such firms are numerous and successful. Holland and Germany can show two or three; in Switzerland the house of Froebel at Zürich

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[1] See Paxton's Botanical Dictionary.

Photo by Richard Averill Smith

An appropriate and beautiful dooryard rock garden for a suburban home.

and the Floraire garden of acclimatisation at Chêne-Bourg near Geneva have now for many years had a world-wide connection. More and more, in proportion to the growing passion for mountaineering, the number increases of those who cultivate mountain flowers in the rockeries or borders of their gardens, and the literature which has grown up about these plants and their culture forms no inconsiderable part of our horticultural and botanical bibliography.

Rarely do the plants that people bring from the mountains give them the satisfaction they have anticipated. The reason for this is easy to grasp. They are usually uprooted while in bloom, because it is at that moment that we are struck with their beauty. When their charm disappears we often no longer care to keep them, for after this rude upheaval, one can hardly recognise them. If you would move plants from the mountains to the lowlands with some chance of success, it is necessary to proceed methodically. First of all, transplant them while they are dormant. To do that you must learn to recognise them when their foliage alone distinguishes them from the surrounding plants. This knowledge can be quickly acquired and one very soon seizes upon the characteristics which differentiate one from the other.

When one is transferring a plant from one climate to another, it ought to undergo for a time special treatment in order to become accustomed, little by little, to the new climatic conditions to which it will be exposed. To some degree one must take into account in this period of acclimatisation the previous conditions of existence, and advance little by little toward the new surroundings. In the great majority of cases, the plants of the high mountains are easy to acclimatise, but there are some to which we must give great care.

I have spoken of the rapid development of vegetation at the moment when the winter carpet of snow disappears from the high mountains, and of the short space of time allotted to alpine plants to complete the cycle of their annual existence. It is at the end of the period when the plant has bloomed, when it has ripened its seeds, and when the sap begins to recede that we may try to transplant it to the lowlands. We must then remove from its roots all the earth. This is a help, for it lightens the burden when carrying the plant. It is important to have the main roots and to preserve them intact. Of course, these rootlets must be wrapped in moss, sphagnum, or some substance to keep them from drying.

A good gardener will know very well how to manage with these as with other perennials. He will cut the ends of the roots with a sharp penknife and get rid of all that are injured and torn. He will plant each root, well cleaned, in its pot. These should be, if possible, narrow and deep, well drained in order to prevent the roots from rotting, and they should be placed in a cold frame and as near the glass as possible. The soil provided to begin with must be light and sandy; calcareous for the varieties that like lime, and granitic for the others. The soil may be prepared with a layer of peat or turf, a layer of fresh earth and another of sand, granitic or calcareous, as the case may be. The bed should be shaded from the full sun and closed during the first few days. The watering should be moderate and the foliage ought to be sprinkled often.

Little by little the plants will become accustomed to the air, and when they have put out some good roots (one can ascertain that condition by giving the pot a light blow with the palm of the hand) one can take them from the bed. If it is October before the plants have reached this state, they must be left in a cold frame during the winter. It is important during bad weather to keep them dry and water them very little. We shall have to watch them on account of the damp and to protect them from sudden changes in temperature. If they are kept under glass all the winter, it is above all necessary to guard them against rain and damp. One need not be afraid to give them plenty of air on days when it is not too cold.

Then when the warm rains come in early spring, lift the cover and let them be well sprinkled with water. They must be accustomed little by little to the open air, and when they are well rooted, place them with others that are already acclimatised—that is to say, we must place them in another bed quite in the open before setting them in their permanent places in the rock garden or in the border.

If we proceed in this way when transplanting from high altitudes while the plants are dormant, we are almost sure of eighty per cent success. In this way we have taken the most delicate plants from Canada, from the Caucasus, from Siberia, from Norway, from Lapland, and from the Rocky Mountains, and we have acclimatised them perfectly in our alpine garden at Floraire. Afterwards we have sent them to the flower lovers of all countries. They generally succeed because they have undergone a real acclimatisation.

This system has many good points, most of all because it is easy to transport uprooted plants without any earth. The plants will send out shoots and, because nearly every plant will succeed, it will be necessary to remove fewer specimens from their native haunts. There is, besides, a point upon which we must lay emphasis, and that is that we shall succeed better with fairly young plants (not too young and frail, of course) than with those which have large roots.

Plants with large taproots are more difficult to acclimatise; for example, the Papillionæ, the Gentians (especially *G. lutea, purpurea, punctata, Burseri,* and *pannonica*), the Queen of the Alps (*Eryngium),* the Anemones of the group Pulsatilla, and so on. Efforts at transplanting are usually not successful except with very young plants. On the other hand, all these varieties germinate easily and are readily raised from seed, and this is the best and most practical way of acclimatising from the high mountains.

We use seed by preference at Floraire, and it is from seed that we get our best results. It is also the most reasonable way, for it is the means employed by Nature herself.

SEEDING

It is generally thought that the process of raising such plants from seed is slow and difficult. That may be true in some cases, in particular for species of slow growth, such as the Gentians, the Primulas, some Ranunculus, Ericas, the Vacciniums, and the Pyrolas, but in the majority of cases this method—which is simple and within the reach of everyone—will give strong plants at the end of two or three years. The important thing, of course, is to sow good fresh seeds and true to name. The alpine garden of acclimatisation "Floraire" has been established entirely with the aim of proving that we may, instead of invading the mountains and despoiling them, grow their flowers from seed. Of the nearly 7,000 plants named in our general catalogue, more than nine-tenths have been raised from seed or by cuttings or grafting and are thus absolutely acclimatised to the air of the lowlands.

Sowing seed is without doubt the most practical means of cultivating with ease plants which are native to regions of perpetual snow. To succeed well, it is important to provide a light, sandy soil with just enough nourishment to give the necessary elements to all the young plants. We make it of:

one-third peat or soil composed of rotted turf,
one-third fresh garden soil, and

one-third sand, granitic or calcareous, according to the affinity of the species.

The most favourable time for sowing seed is, for a cold or snowy climate, at the end of the autumn. That is to say, the end of November or the beginning of December. We sow in pans, boxes, or pots, with a good drainage. But we can also sow seed in the springtime, and in most cases, particularly in countries where there is little snow, this method is preferable to autumn sowing. One must be careful to cover the seeds but slightly and not to bury them in the soil. The pots or pans must be placed in a cold frame which is dry and clean. From the time when the snow begins to fall, if it does fall, we uncover them and let the snow make a heavy covering over the seeds. It is well even to heap up the snow upon them, and if possible to sprinkle them with water on frosty nights so as to transform the snow into ice.

The snow exercises no small effect upon the seeds. We have made conclusive experiments on that point. Two lots of seeds of difficult germination were sown at the same time and in the same conditions, but while one lot was covered with snow, the other was kept from it. Those covered with snow all germinated together most satisfactorily in the month of March, while the others came up very irregularly and much later.

Pastor W. Müller of Württemberg made similar experiments with equally interesting results. He prepared the seeds which he found most difficult of germination by placing them for two or three days in a basin of melting snow, then he sowed them in shallow pans placed in a cellar and covered them with melting snow. When the snow had had some time to act on the seeds he brought up the pans to a room heated to a temperature of 70° by day and to from 50° to 60° by night and up to the time of their germination he kept them covered with snow. "The application of snow," he said, "must exercise an electric influence upon the seeds, for it awakens the life in them rapidly. The colder the snow the more rapid the action upon the seeds." By this means he has obtained the germination of Pansies and of the Asiatic Ranunculus in eight days, and that of Ixia, *Primula obconica, auricula,* etc., in fourteen days. He has found that by applying this method all the seeds germinate, and he hardly loses one.

In a country which lacks snow, it is preferable to wait until March to sow the seed, and to let as much rain as possible fall on the seeds. If the pots are well drained, it can do no harm. If one sows seeds later, as must be done in dry Southern countries, one must add a little powdered sphagnum in order to give the soil a spongy, porous consistency, and at the same time help it to keep an even degree of moisture. The sphagnum plays here the part which the rocks play in nature. It absorbs the humidity and retains it, then gives it out little by little to the soil which surrounds it. It is an equalising element from a hygrometric point of view.

The species which first commence to germinate are those which belong to the family of the Cistaceæ (Helianthemums, Cistuses), the Compositæ (Asters, Edelweiss), the Crucifers (Draba, Erysimum, Æthionema, Alyssum, etc.), the Leguminosæ (Oxytropis, Phaca, Astragalus, Genista, Cytisus, Anthyllis, etc). Then come the Crassulaceæ (Orpines and Houseleeks), the Saxifrages, Campanulas, Potentillas, etc. The species that take the longest to germinate are the Gentians, unless the seed is very fresh, the Primulaceæ (Primula and Androsace), certain Ranunculas, the Peonies, some Anemones (especially the Pulsatilla group), the Aconites, the Umbellifers (Eryngium, Astrantia), the Fraxinellas, which take as much as two years to germinate with us, some kinds of Berberidaceæ, such as Leontice and Jeffersonia, some Liliaceæ, Colchicaceæ, and Irises, the Corydalis, etc.

It is a mistake to think that a seed is lost if it has not come up at the end of a few months. We should not throw them away before a year at least, and when one tries with the families or species enumerated above one should wait for two years before losing hope.

The germination of seeds is a most capricious thing. While the sowings of *Anemone alpina* and *sulfurea* come up at the end of from twelve to twenty days if they are fresh, they will delay several months —sometimes even years—when they are four or five months old. It is almost the same with the Gentians and the Primulas. Professor Sir Michael Foster showed me many years ago in his superb garden at Shelford, near Cambridge, some Irises which did not germinate until twelve years after sowing!

When the seeds have germinated and when the little plants begin to take on a little substance, we "prick them off"; that is, we separate them and plant them a certain distance apart in rows. Later, when they are in a state to stand quite by themselves, we plant them one by one in little pots, after which they can be placed in the open ground or in the rock garden or planted in larger pots.

We increase our stock also by cuttings and by grafting, but since many of the plants of the mountain flora are herbaceous and do not have branching roots they cannot be divided. Cuttings from such are made in the late summer in well-drained pots and placed under a "cloche" (a bell glass which, attracting and imprisoning the warmth of the sun, hastens growth of plants under it), or in a cold frame in sand. Grafting is possible, particularly for species of the genus Daphne, for the Pomaceæ, the Salicineæ, the Acantholimons, some Compositæ, the Rhododendrons, the Peonies, etc. This is generally done in the wintertime.

The Culture of Various Species

The culture of plants of the high mountains is easier than their acclimatisation by transplanting them. After having studied the nature of alpine flora, and the conditions under which it exists in the glacial regions, it will not be difficult for us to prescribe the method of culture for those frail plants.

The plants introduced into cultivation are grouped into ten categories, according to their nature, their needs, their special demands, and their manner of growing, as follows:

GROUP I

WOODLAND AND PASTURE PLANTS of the mountain regions, which can be cultivated in the same manner as ordinary perennials; that is, in any healthy and cultivable soil. These plants are numerous and include species loving half shade as well as sun, moist, cool places as well as dry slopes. Such are the Aconites, the Delphiniums, the Tulips, the Colchicums, the Acanthus, many Campanulas, the Helianthemums, *Gentiana asclepiadea* and *cruciata,* several Anemones, nearly all the Pinks, the Aquilegias, the Centaureas, several Geraniums, the Trollius, the Thalictrums, etc.

These plants, from the cultural point of view, occupy a place between the perennials of the open country and those of the high mountains. They are satisfied with little, preferring poor soil to rich earth well fertilised, and they are adapted to the decoration of large rockeries, of alpine gardens, of parks and picturesque gardens. They can be cultivated also in narrow borders, and in the herbaceous borders that the English love so well. The chemical composition of the soil matters little to them and their culture is of the easiest in good garden loam.

GROUP 2

SHADE-LOVING PLANTS, that can be used in woodlands and on rocky slopes facing north. Such for example are the Ferns, certain Lilies, some Aconites, etc. These plants love a soil rich in humus, porous, light, and well drained—the black and spongy leaf mould, the holes in shady rocks where humus accumulates are the most propitious places for their development. Leaf mould or peaty earth mixed with good fresh loam is the best soil we can provide for them.

GROUP 3

PLANTS FROM MOIST OR MARSHY PLACES, which furnish the "bog garden" of the English, such for instance as the Buttercups, the Trilliums, some Cypripediums, bog Orchids, Parnassias, the Lysimachias, Mimulus, several Saxifrages, etc. Plants of this class need a soil even more spongy than that provided for the preceding group, composed of turf, sphagnum, good garden loam, and pebbles and, as far as possible, constantly watered.

GROUP 4

WALL PLANTS, with some exceptions loving the full sunshine. They ask but little in the way of soil, their roots spreading themselves among the fissures of the rocks, going far to find the moisture and the nourishment of which the plant has need. They can be easily introduced in the interstices of the walls or the fissures of rocks, and it is enough to support them with little pebbles, or to press them firmly with a stroke of a hammer or simply by pressure of the thumb. Some species, such as *Corydalis lutea* and *ochroleuca,* the Linarias, some Campanulas, the Erinus, can be sown directly in the places they are to occupy, their seeds being buried and pressed in the crevices by means of little balls of moist earth on the sides of which they will later start to grow. In our catalogues we designate that category by the sign ///.

GROUP 5

PLANTS OF THE PEAT BOG of slow growth, such as the Heath, the Blueberry, and the Rhododendrons. They must have a light, porous soil composed of two-thirds peat, a little garden loam, and the rest sand, granitic or calcareous, as the case may require.

GROUP 6

ORDINARY ROCK AND ALPINE PLANTS; that is to say, all those that come from the high mountains, and ask for less care than the varieties in Group 8, but more than those in Group 1. They must have a well-drained corner, and a position in full sunshine with a soil composed of one-third leaf mould, one-third fresh loam, and one-third sand, with a little sphagnum added if the climate be dry.

GROUP 7

BULBOUS SPECIES AND MEADOW PLANTS, that we plant among grass, or among dwarf and spreading plants in order to avoid having empty spaces during a good part of the summer. These plants, losing their leaves during the summer, easily accustom themselves to the company of other plants that grow and flourish during the season while they lie dormant.

GROUP 8

DELICATE SPECIES OF THE HIGH AND SNOWY REGIONS, which grow between rocks or in the meadows of the highest mountains. The soil we use for them is made up of half sand, a quarter good garden soil, one-eighth peat, adding a little leaf mould, and one-eighth little broken pebbles.

The pots in which we place these plants or the pockets which they are to occupy should be thoroughly drained by means of little pebbles or bits of stone mixed with sphagnum if the climate be dry. The plants of this group have a horror of stagnant water and of the rains of winter. Growing them in pots is best for their welfare, but they can also be put among rocks. But best of all is to give them a good, well-exposed opening in a wall.

GROUP 9

THE MOST DELICATE PLANTS are included here, those that in our Continental climate must be cultivated after the method of our *tourbières* (p. 54); species which dislike the lime must have sphagnum culture.

GROUP 10

PLANTS FOR MORAINE TREATMENT, which is described in detail below:

What is a moraine? Every alpinist is able to answer the question, but none of them will admit the interpretation which the gardening world in English-speaking countries attributes to that word. Nevertheless, we must go with the stream, and despite my struggle against my late friend Farrer for the respect of the word in its true sense, I will accept it as do the English alpine plant growers. I am too modest a man to be able to impose my opinion on a whole nation! But I must describe the natural moraine in order to give the reader an idea of what it is.

The glacier is a river of ice; it moves more or less rapidly according to the steepness of the slope, bringing with it the rocks and gravels which have fallen upon it during its course. These materials are carried down to where it ends. There they form a bed of stones and gravel, the size and depth of which are proportionate to the dimensions of the glacier. This is the moraine and when it is newly formed you may not find on it anything but what we call the first pioneers of vegetation *(Petasites, Epilobium Dodonæi; Linaria alpina; Artemisia spicata* and *mutellinum; Saxifraga oppositifolia,* etc.) which require no humus and live on little of anything. By degrees, as débris accumulates, seeds introduce new kinds of plants, and so on.

Courtesy, House and Garden

An appropriate planting in partial shade at the edge of the famous rock garden of F. Cleveland Morgan near Montreal, Canada.

The moraine as it is understood in the gardening world is the peat bog such as we have created at Floraire and which I shall describe later (see p. 62); a bed where the plants are watered from below. This we have had for more than forty years. That the soil of a moraine must be poor is obvious: in the high mountains the soil is often pure sand, mixed sometimes with a poor and scanty humus. One of the reasons why high alpines succeed in the moraine is that they find there a poor, gritty soil and are not overfed. A great many plants die because the soil is too rich and I always preach that rich soil is pernicious to alpines. I saw in New England an alpine garden which was very luxuriant in growth, but poor in flowers and in colours. The Helianthemums were 50 cm. high with healthy, bright green foliage, but they did not flower. The soil was too rich, the gardener having manured it.

In the moraine, alpines have nothing to fear if it is well understood. The soil must consist of sand, grit, and very little peat and must be well drained and *watered from below*. The moraine must be exposed to the sun and to the winds. In it you may succeed with many rare and delicate things: the Androsaces, Gentians, Eritrichium, tender Saxifrages, Soldanellas, *Silene acaulis, Phyteuma comosum, Campanula Zoyzii;* even *Diapensia lapponica.* I saw once at Hindhead a delicious moraine garden: a sort of suspended terrace on an elevated frame 1½ metres high, richly drained and well exposed, with shade possible for the hot days. In it were all the rare treasures of our high Alps and they were almost as healthy and luxuriant as in their natural surroundings.

Mr. Clayforth, the excellent translator of my book, *Alpine Flora,* gave a better description of the moraine than I myself could give and I reproduce it here.[1]

> These "moraines" at once call to mind two cardinal points of good cultivation—one still only half-understood, drainage; another almost invariably neglected, top-dressing. Many are too apt to fancy that the benefit of good drainage is summed up in the prevention of stagnant water about the roots. But drainage does far more; in light soil, where it should especially be deep, it guards against drought as much as in retentive soil it guards against sourness. By giving free passage to the rain it opens aerating channels and carries warmth through the subsoil; it prevents a caking of the surface in fiery sunshine and by checking evaporation prevents an accumulation there of saline constituents and so secures an even distribution of inorganic matter throughout the whole feeding ground. And it is upon this slowly dissolving inorganic matter that alpine plants chiefly live.
>
> It is true that even in the highest ones there are extinct lake beds and similar places, where alluvial soil has gathered to great depths; there are half drained bogs, so that among our alpines are found plants happy in loam, or peat, or swamp. But the majority grow in a shallow layer of soil upon the native rock. Some may be shallow rooters; but even these draw most of their sustenance, not from the scanty organic substance around them or from such little portion of the direct rainfall which that layer can retain, but from the ever trickling film of moisture along the surface of the rock, a moisture that fell as rain upon the higher slopes and descends charged with soluble inorganic salts. Others bury their

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[1] See H. Correvon, *Alpine Flora,* p. 12.

main roots far down in imperceptible, inconceivably narrow fissures, into whose depths little organic matter can penetrate.

We could not imitate these fissures except by splitting some huge rock by chisel or wedge and fitting the two edges close together and spreading a little soil about the upper edge. Our narrowest pockets are by comparison chasms, as it were, choked with mingled grit and humus. Not that one even advocates the attempt to imitate them; to do so would be to forget the enormous waste of vegetable life upon the Alps; for one plant that survives and thrives how many never germinate or wither almost before they have begun to grow? But, the fact that it is in such circumstances that alpines grow best demonstrates the need of a constant supply of soluble salts, well distributed, and this can be secured only by deep and perfect drainage.

Again, alpine plants are constantly receiving top-dressing. In nature the process is natural. In our gardens it is also essential: it provides food for superficial roots, promotes the formation of layers, corrects the action of frost in lifting plants at the collar from the ground. For this we use compost. If of grit, it will keep the soil cool in summer and dry in winter, to save the leaves from damping off. Broken sandstone will absorb the surface moisture—indeed the benefits are well-nigh innumerable.

In conclusion the translator would emphasise the importance of growing alpine plants from seeds; it is safe, cheap, and interesting.

CHAPTER IV

LIMESTONE-SOIL AND GRANITIC-SOIL PLANTS

THE vegetation of the mountains can be divided into two groups, the plants which like or tolerate lime or chalk (calcicole), and those which cannot stand it (calcifuge). The classification into two definitive groups, however, cannot be maintained, as a great many plants are ubiquitous, tolerating both kinds of soil.

As an illustration of the difference between these flora, here is a short list of some nearly allied species grouped according to their chemical affinities:

LIME	GRANITE
Achillea atrata	*Achillea moschata*
Alyssum alpestre	*Alyssum Wulfenianum*
Androsace Helvetica	*Androsace carnea*
Androsace lactea	*Androsace glacialis*
Anemone alpina	*Anemone sulfurea*
Astrantia major	*Astrantia minor*
Dianthus alpinus	*Dianthus glacialis*
Draba tomentosa	*Draba frigida*
Gentiana Clusii	*Gentiana Kochiana*
Phyteuma orbiculare	*Phyteuma hemisphæricum*
Primula Auricula	*Primula hirsuta*
Ranunculus alpestris	*Ranunculus crenatus*
Rhododendron hirsutum	*Rhododendron ferrugineum*
Saxifraga cæsia	*Saxifraga Seguieri*
Silene alpestris	*Silene Pumilio*

Lime (*Continued*)	Granite (*Continued*)
Silene Elisabethæ	*Silene rupestris*
Thlaspi rotundifolia	*Thlaspi cepæfolia*
Veronica saxatilis	*Veronica fruticulosa*

Obviously it is important for the successful cultivation of these plants to know their affinities, as to the presence of lime or silica in the soil and what to give them or not to give.

My personal experience during the sixty years that I have been studying and growing alpines is favourable to the distinction in a great many cases.[1] There are very many plants which we cannot grow here in our limestone soil and which we water with our lime-holding water.

Almost all the Heathers, the Rhododendrons, the Asiatic and North American Lilies; the marvellous plants of New England, of Japan, and a great many of those brought from China, cannot be grown here without special attention. We are compensated, however, by the fact that all the "calcicole" or alkaline-soil plants do better with us and the blue of the *Gentiana verna* is brighter here than in acid conditions. Perhaps this is a small consolation!

In 1926, when I visited the experimental gardens of the Bureau of Plant Industry of the Department of Agriculture at Washington, D. C., I was much interested in the valuable cultural experiments of

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[1] Dr. Coutagne of Lyon, founder of an interesting botanic garden in the Maure Mountains (south of France), writes a very suggestive memoir on this question in "Les Plantes Calcifuges," in *Bull. Soc. Dendrol.*, France, Feb., 1926. He goes farther than myself in speaking of the importance of a suitable soil for calcifuge plants.

Professor Coville and Dr. Wherry. The influence of soil acidity was clearly demonstrated and in an important report on the culture of the Blueberry Professor Coville demonstrates the possibility of growing *Vaccinium uliginosum* (one of the plants that most hates lime) commercially for its fruit.[2]

Similar experiments have since been extended to other plants and prove that a large number of species require similar culture. Lack of success is due to failure to provide them with the acid soil which they require. This is especially the case with the plants of the Ericaceæ (Rhododendron, Epigæa, Kalmia, etc.).

"In nature," says Professor Coville, "acid nourishment is provided by the accumulation on the ground of a layer of half rotted leaves, twigs, and rootlets. Such an accumulation, when it occurs in a sphagnum bog, is called peat. Under good conditions upland peat is laced into a tenacious mat, a few inches in thickness, by the roots of the ericaceous plants that accompany it, and this mat persists year after year, continually renewing itself through each year's leaf-fall and the penetration of new roots into the decaying mass.

"On limestone soils or on soils which for any reason have an alkaline chemical reaction, upland peat does not form. The lime and other alkaline substances in the soil greatly hasten the decomposition of the leaves. Each year's leaf-fall is decomposed, much of it passing in liquid form into the underlying soil, prior to the leaf-fall of the following year. Fully decomposed leaves form a true leaf mould, black in colour and neutral or alkaline in reaction, in which Rhododendrons and other acid-soil plants will not grow."

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[2] Coville, *Experiments in Blueberry Culture,* Dept. of Agric., Bureau of Plant Industry, Washington, 1910.

Elsewhere[3] I have given an account of a study of the cultures made in acid soil by the famous French chemist, Dr. Rosenstiehl. Here I will only point out the necessity for alpine plant growers who live on alkaline soil to provide a special arrangement for the plants which dislike lime. This is not necessary over large parts of England and of the United States. But calcareous or alkaline soil regions are numerous and there the supply of peat is a great question in horticulture. Let me repeat here the story told to me once by my late friend, Lord Avebury, of an English Ambassador to Vienna who asked to be transferred to another country because in Austria he could not grow Rhododendrons, which were one of the necessities of English life.

Mr. A. Grove[4] gives us a list of lime-loving Rhododendrons, and the traveller, Forrest, assures us that in the high mountains in Yunnan and in Tibet the Rhododendrons grow on pure lime without humus. Mr. Grove has grown them on lime and states that the Chinese Rhododendrons can all be grown on lime, while those of the Himalayas dislike it and without exception require an acid soil.

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[3] *Plantes des Montagnes et des Rochers,* Chap. IV.

[4] *Gardeners' Chronicle,* 1927, II, p. 428.

CHAPTER V

GROWING ALPINE PLANTS IN SPHAGNUM, IN PANS, AND IN THE "TOURBIÈRE"

THE importance of sphagnum moss as an element contributing to the porosity of the soil has long been recognized. It is impossible to overestimate the advantages that result when species with delicate roots and of slow growth are grown in marsh sphagnum. For more than forty years in sowing seeds of delicate species of alpine plants, I have used sphagnum in the soil as a means of regulating the degree of moisture. It is a physical element which acts as a sponge, absorbing humidity when it is abundant and giving it out when needed as the earth becomes dry.

After what I have previously said concerning the conditions necessary for the existence of alpine flowers, the importance of this moderating element will be readily understood. Mountain soil is porous, but even more porous are the rocks which crop out everywhere. They play no small part in the economy of things in the Alps, absorbing the water of rains and fogs, retaining it and giving it out to the air or to the roots of neighbouring plants. Everywhere in the rocks moisture continually oozes forth, which keeps the roots of the plants cool.

Alpine vegetation, so beautiful and so delicate, unfortunately suffers in Continental countries from excess of dryness and the too ardent heat of the sun's rays. To remedy this serious trouble, sphagnum has a moderating and a compensating influence. Its importance from a cultural point of view is that it is a porous material which absorbs the water and gives it back little by little to the roots which surround it. Sphagnum is one of the very rare examples in the world of mosses which possess two kinds of cells, one of which contains chlorophyll, the other water. The watery cells are of great importance to the humidity of the soil, for they are delicate reservoirs for holding water, even under conditions of the greatest heat. Besides this, the leaves of the sphagnum are closely superimposed and imbricated after the manner of tiles on a roof, thus leaving between them a free space which retains the water for some time. This peculiar construction of sphagnum renders it almost as absorbent as a sponge.

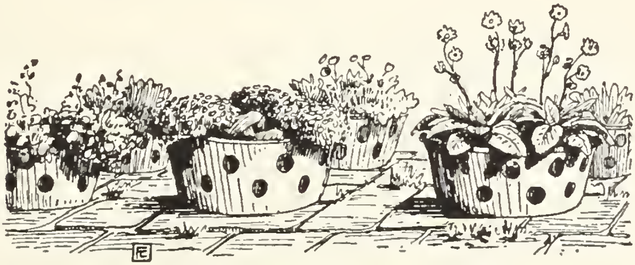
For a long time gardeners, and especially those who grow Orchids, have used sphagnum in greenhouses, whether warm or temperate. It remained for some Italian gardeners to demonstrate its value in the culture of the more delicate plants.

Having discussed the subject with Dr. Briosi, Director of the Botanic Garden in Pavia, and Cavaliere Bucco of the Botanical Garden of Genoa, I made some experiments in my alpine garden at Geneva. It was then in the old location at Plainpalais—most defective in all respects, shut in between houses, badly aired and with a poor exposure. The results obtained were nevertheless surprising.

On March 20, 1891, I made a place on top of a wall fairly well exposed to the sun. It was level and upon it I stood several pots of sphagnum (already eight years old and quite dead, for I had no other), in which I planted: 1. A miserable root of *Arnica montana* which I had kept alive with difficulty for a year; 2. One of *Astrantia minor,* in a similar condition and of sorry appearance; 3. One *Gnaphalium leontopodium* (Edelweiss), a year-old seedling; 4. *Leucanthemum alpinum;* 5. *Androsace Helvetica;* 6. *Parnassia mysorensis;* 7. *Saxifraga aizoides;* 8. *Saxifraga carpathica;* 9. *Saxifraga stellaris;* 10. *Soldanella alpina.*

A glance at this list will convince the veriest amateur that I was making my trial with species of the most difficult culture in our locality, except the Edelweiss, which was included in the list because of its great popularity. Hitherto I had never been able to bring to flower at Geneva *Arnica montana, Soldanella alpina, Saxifraga aizoides* and *stellaris,* and *Leucanthemum alpinum.* A connoisseur will see at once that the test was made on plants of different natures, whatever might be their soil chemistry affinities. Some of them, like the Edelweiss and *Androsace Helvetica,* were lime lovers, while the others—Arnica and *Saxifraga stellaris*—are granite lovers. The Soldanella, Saxifraga, Parnassia, and Astrantia are species which grow in cool, moist places, while others—Edelweiss, Androsace, and Leucanthemum—flourish in dry places.

All the earth that clung to their roots was completely removed and they were planted in pure sphagnum, with their roots bare. The pans were provided with numerous holes through which the water could easily pass. At the end of a few days there was a redoubled activity in the development of all the plants. The heart of the Soldanella became enlarged, the yellow leaves of the Arnica were veined and took on a green tint. At the end of three weeks their appearance was such that they would never have been recognised as the same plants; and, on the seventh of June, in the same year, that is to say, at the end of three months, I was able to exhibit at the meeting of the Horticultural Society of Geneva a superb plant of *Arnica montana* bearing three beautiful flowers, though before that I had never been able to make it bloom at Geneva. I exhibited at the same time an Edelweiss with some large flowers of a very pure white. The three Saxifrages were in full



Plants growing in pans of sphagnum.

bloom and the Leucanthemum bore a beautiful cluster of flowers.

The year following the results were such as to excite the enthusiasm of all visitors to our garden. The Soldanella bore, in March and April, more than fifty flowers. The Edelweiss had a dozen beautiful heads, the Arnica was glorious—all succeeded beyond our highest expectations.

Seeing this, a Swiss amateur, living at Cannes, decided to try the same method under the heat of the Provençal sun, and succeeded equally well. Here is what he wrote to me on May 7, 1892:

> Here are some details regarding my efforts in acclimatising alpine plants at Cannes. The seeds in general have come up well. They were pricked off recently. Regarding the plants that you have sent me, here is the order and date of their blooming:
>
> January 1—*Linaria alpina.*
> February 1—*Heuchera sanguinea.*
> March 1—*Saxifraga oppositifolia.*
> April 1—*Linaria pallida.*
>
> These were, it is necessary to state, modest efforts at blooming, except for the *Linaria alpina* which was in good condition and which began to bloom a second time. In full bloom:
>
> April 10—*Linaria pallida.*
> " 15—*Primula rosea.*
> " 16—*Geum coccineum.*
> " 17—*Dianthus alpinus.*
> " 18—*Heuchera sanguinea.*
> " 19—*Erinus alpinus.*
> " 24—*Linaria alpina.*
> " 25—*Helianthemum roseum.*
> " 27—*Saxifraga Cotyledon.*

The winter has been wretched, rainy, windy, unusual for Cannes. The alpine plants have been placed against a wall facing south—the earth in the pots well drained and filled to half their depth with sphagnum.

In Tokyo a Japanese botanist who made similar experiments also had excellent results. I published an extract of his letter in the *Garden,* London, January 7, 1922.

On the other hand, growers of alpine plants who have followed this method in countries which are favourable to the culture of alpines because of the natural humidity of the air, such as England, Belgium, Holland, and the West of France, did not succeed so well. It is clear that this method is successful only in warm, dry climates.

Encouraged by these results, I had made a large number of pots perforated with holes, and I prepared to grow on a large scale all the delicate species with the intention of exhibiting them at our Swiss National Exhibition in 1896. We prepared one hundred and twenty pots, holding one hundred and twenty of the rarest plants which at the same time were most difficult of cultivation.

Complete success crowned our efforts, and the one hundred and twenty pots of alpine plants exhibited at the National Swiss Exhibition at Geneva from May to October, 1896, received the warm admiration of the public. They obtained the gold medal which had been very rarely given to anyone.

All had blossomed freely and all produced good seeds. But what is most interesting to state is that the closely allied species and varieties had preserved, and even seemed to have accentuated, their peculiar characteristics. We also grew side by side *Geranium argenteum* and *cinereum,* which naturally grow alongside each other, and *Linaria alpina* and *petræa,* which have often been considered to be one and the same thing. Their culture in sphagnum produced types altogether different, especially among the two Linarias.

The disadvantage of this method of growing is that the plants develop too rapidly and produce too many flowers and seeds on each, so that exhaustion takes place at the end of one or two years and it becomes necessary then to renew and rejuvenate the root. That is easily done, thanks to the numerous shoots which perennial plants produce and to the great number of branching roots of the creeping kinds. When we want to produce the greatest possible number of roots of rare and delicate plants for sale, we grow them in sphagnum in order to develop many shoots on each individual, and to get a greater number of branches for cuttings and roots for division.

This method of growing plants has been perfected in many respects. At Floraire, where the exposure is greatly superior to that of Plainpalais, we are well situated for this method of procedure. It resembles the hot and dry atmosphere of Lombardy.

The special pots filled with pure sphagnum, well broken up and pressed down, are placed on a bed of pebbles to insure drainage. The plant, with its roots free from all soil, is embedded in the sphagnum, after which the pot is plunged in water for some minutes. Then it is placed in full sun, if possible on a wall or a bed of pebbles. Thus the plant is constantly surrounded by humidity, and from this porous mass, where its roots are placed, the water escapes constantly in a sort of vapour surrounding the plants and protecting them from the sun's rays. The root system develops very rapidly in the warmth and moisture, and in a little while our pot is filled with roots and rootlets.

The results are better if the summer is very dry and sunny, and it is surprising to see some plants, such as the Androsaces of the Aretia group, withstand the hottest rays of the sun, thanks to this continual evaporation. It is, of course, the same phenomenon which occurs on the surface of rocks or on old walls from which rise the vigorous fronds of the most delicate ferns.

Sphagnum culture is especially suitable for the south of England, the centre of the United States, California, South Africa, and Australia. Sphagnum is found in the mountain marshes of cold and temperate countries and every Orchid grower knows of some source of supply.

Instead of putting sphagnum in individual pans, large sphagnum beds such as we have at Floraire may be established. We dig a trench 80 cm. deep and cement it like a big basin, with an opening at one end; we fill the bottom with a bed 20-25 cm. deep of (if possible) water-worn round stones so that the water can run through easily. Then, we put in a bed of sphagnum 15-20 cm. deep to protect the stone bed against infiltrations of soil, a kind of mattress bearing the upper part and keeping the subsoil free for the water to run through. The upper part is filled with either pure peat or turf mould or with sphagnum, according to the method of cultivation in view. The water is brought in at one end by a faucet which is opened as often as required and the water runs like a rivulet, being absorbed by the upper part through the mattress of sphagnum according to the needs of the plants. The soil is thus watered from below instead of from above. The bed of sphagnum neutralises the lime of the water and so even in our conditions we are able to grow calcifuge plants without difficulty. The upper part of the bed is an acid peat soil. In such conditions we have grown *Eritrichium nanum,* the delicate Androsaces of the Aretia group, *Gentiana purpurea, bavarica, Rostani, pyrenaica,* and *pumila; Houstonias,* and many other rare plants which we had never been able to acclimatise here before. A necessary condition for success is to have the bed exposed to the full sun, and, if possible, in a windy situation. This is what Farrer for some reason or other called a "moraine."

CHAPTER VI

THE WALL GARDEN

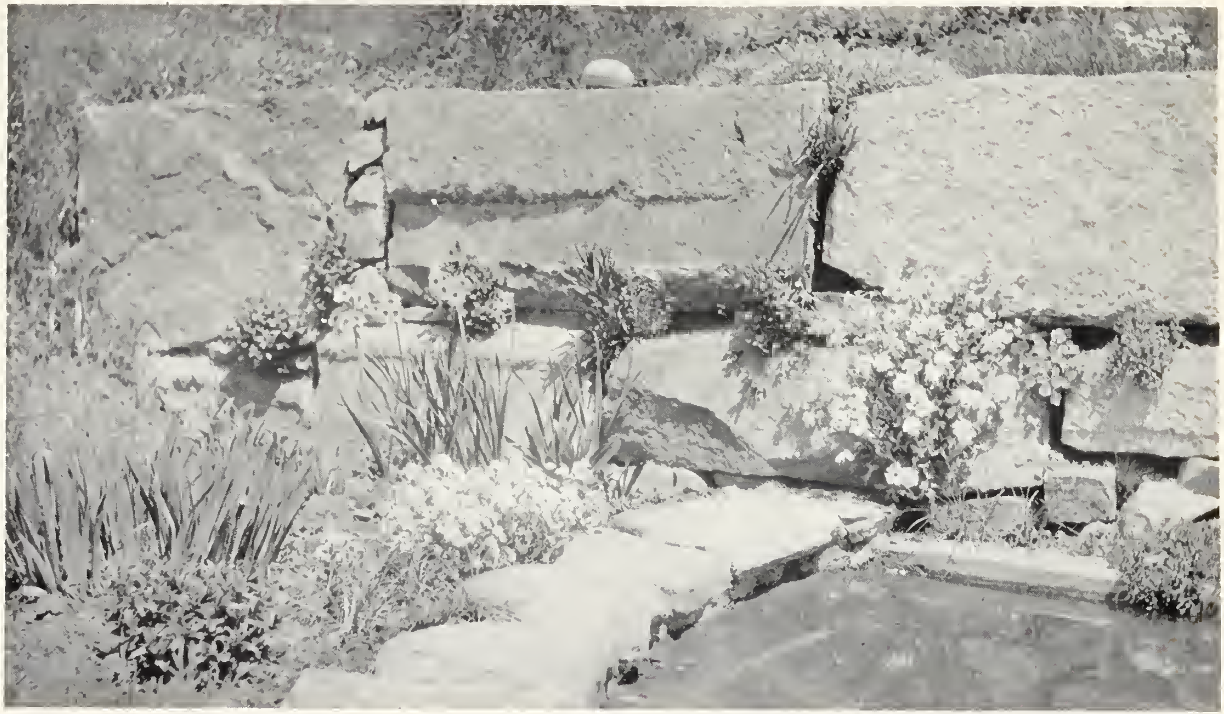
Flower in the crannied wall,
I pluck you out of the crannies,
I hold you here, root and all, in my hand,
Little flower—but if I could understand
What you are, root and all, and all in all,
I should know what God and man is.—TENNYSON.

OLD walls are generally inhabited by a vegetation of their own. And the drier the country (within certain limits) the more beautiful are the flowers on the walls. There must, of course, be a constant supply of moisture for their roots. In French or Roman Switzerland, where large vineyards are sustained by walls, their surfaces are often adorned by wild flowers, and even by the most delicate Ferns. The purple masses of Aubrietia which were imported forty years ago to the gardens of Montreux and have thence spread, now cover thousands of feet of walls in the neighbourhood and from February to May present such a spectacle that one can hardly believe they have not been planted. The Golden Fumitory (*Corydalis lutea*), an Italian plant which escaped from the garden of a friend of mine thirty years ago, covers the walls from Vevey to Villeneuve and near Neuchâtel from Vaumarcus to St. Blaise. It flowers through the whole summer until December, and gives the effect of brilliant sunshine. From the beginning of May till the end of October the brilliant Red Valerian (*Centranthus ruber*) and the Wallflower (*Cheiranthus Cheiri*) adorn these walls with their millions of flowers, red, pink, or yellow. And all kinds of flowers (Campanulas, Dianthus, Saponarias, etc.) come one after the other to adorn the landscape so that all who pass admire the beautiful sight.

All these beauties which the Divine Artist gives us in nature may, in some lesser measure, be reproduced by man about his own dwelling-place. Instead of naked, ugly walls, why not cultivate wall plants to hide the bareness of the stone?

Some architects think that plants injure the walls, an opinion that admits of some doubt. But in any case is it not better to put up with a little injury in order to gain an abundance of wholesome joy for mind and eye? I remember to this day how deep an impression I received from the sight of an artificial rock wall covered with plants and flowers in Mr. Edmond Boissier's famed botanical garden at Valleyres-sous-Rance. I was then a young man, but my mind retains the remembrance of that flowery wall as clearly as on the day when I first saw and admired it, with its large rosettes of the Pyrenæan *Saxifraga longifolia* more than ten inches across, and its tufts of Haberlea from Mount Rhodope.

Alphonse Karr, at St. Raphael, preached the wall garden in vain by his writings and by his example. But there were none to understand his teaching. Still, during the last few years the taste for alpine



A rough rock wall above a tiny pool in Dawson Dell, Lowthorpe School, Groton, Massachusetts.

and rock plants has spread, the ornamentation of rough walls has begun, and the importance of this method of gardening is now acknowledged. Nature has given us a wide range of species that actually prefer to be placed vertically in rockwork; and there are some, even, that will live and thrive in such conditions only.

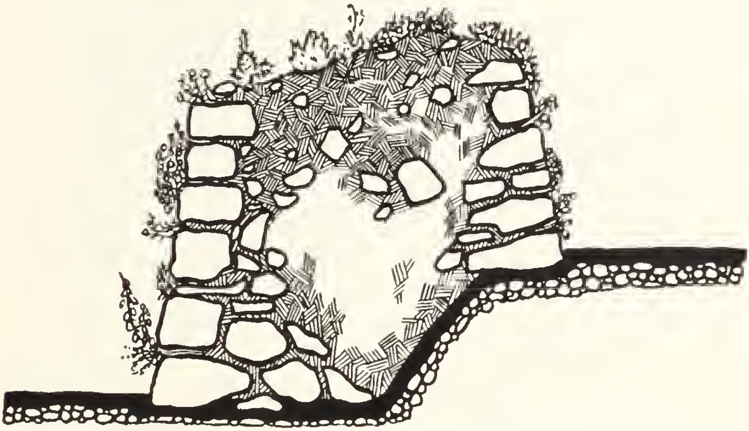
One often wonders how these pretty plants can live, that drive their roots deep into the clefts of the barren rocks without an atom of soil or humus for their organic structure to feed upon. To account for this one must learn something about the part that stones have to play in Nature's economy, for it is one of the largest and most important. All stone, hard or soft, or of whatever nature it may be, is more or less porous and absorbs water by capillary attraction.

The rocks act exactly as does a lump of sugar when its surface touches water and it fills itself with the liquid. During the seasons of rain or fog or damp, the rocks act as sponges and absorb water till they are completely saturated. The more porous the rock, the more quickly is the absorption effected. The structure of the stone comprises a quantity, more or less numerous, of minute fissures that mineralogists know as "diaclases." They are formed imperceptibly under the influence of frost and thaw in the very heart of the hardest stones, producing important effects in the disintegration of mountains.

These diaclases constitute so many canals, which conduct and carry off the water absorbed by the innumerable pores in the internal texture of the stone; they are larger and more numerous in calcareous rocks than in granitic, which accounts for the fact that limestone vegetation is more interesting and varied than that of granite. Now, these rocks soaked with water are reservoirs of coolness and moisture that Nature uses with due circumspection for watering and irrigation. Water often spouts copiously from the heart of the most arid rocks, and it is at the foot of the mountain whose craggy head is wholly barren that the richest springs are found. It is also in the heaps or débris, the barren soil, that the most delicate and often the most brilliant flora is displayed. The roots penetrate far through the heaped-up pebbles or into the deepest fissures in search of the coolness and life that they communicate to the organs spread out upon the surface. Thus we see that in nature a rock mass plays the part of a sponge; it absorbs superabundant moisture and gives it off to the atmosphere or to the roots of plants—often, indeed, to the atmosphere through the medium of the rock-loving plants, and just as the need makes itself felt. This is the reason why so many delicate plants succeed perfectly when we grow them in the crevices of suitable rocks, whereas if we tried to cultivate them otherwise they would be burnt up by the rays of the sun.

Not only are plants delightfully picturesque when planted in walls, but we can thus grow a whole range of delicate species which are certain to die if they are placed with a vertical axis (*i.e.,* with the top spreading horizontally on the ground), because of decay, brought about by water stagnating among their crowded branches and favouring harmful parasitical growths. Walls covered with flowering plants form true botanical gardens—wondrous, ever-changing pictures that one examines and admires with even more enthusiasm than those of the greatest artists, for they are painted by the Great Artist Himself—the Master whose work is above all others.

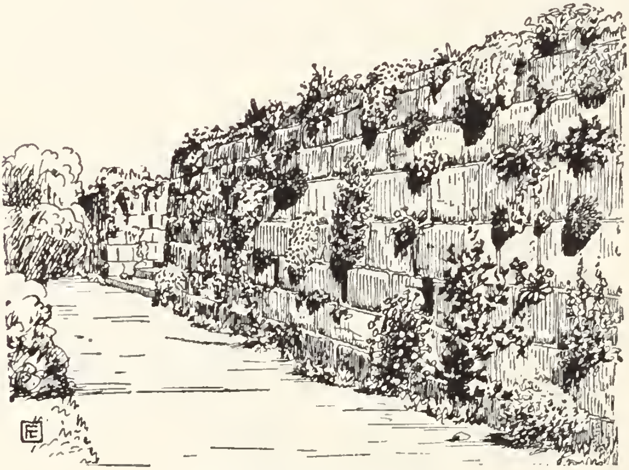
In such a wall one has only to find or make a narrow, deep opening, and to introduce the roots of one's plant, fixing it in position with a little moss or sphagnum, or a rather stiff mould; then one makes all firm by means of a few small, angular stones, securing the stones with cement if desirable. One can often successfully sow the seeds of such plants as are easily raised from seed—Erinus, *Linaria alpina,*



Construction of a wall for growing plants.

etc. These we introduce into the fissures by means of a stiffish soil with which the seeds have been incorporated. In a very few years the wall will be so superbly beflowered as to draw enthusiastic expressions of admiration from everybody.

At Floraire we have some of these walls destined to accommodate the tenderest and most delicate alpine and saxatile plants. The first is a dry wall forming a parallelogram 28 metres long by 2 metres, 10 centimetres broad and 1 metre, 40 cm. high. It is of limestone, and the aspect is southeast to northwest. From the second year onwards this wall was a real botanical garden adorned by flowers from January (*Iberis saxatilis, Draba aizoides, Aubrietia deltoidea*) till December (*Linaria cymbalaria alba, Corydalis lutea, Dianthus gallicus,*



The wall garden at Floraire.

Iberis saxatilis). In the spring and summer months we enjoy all the saxatile flora and some of the best of rock plants. Everyone who sees this wall considers it the most interesting and the most brilliant feature of our whole garden.

The means to attain these delightful results is within the reach of everybody in America as well as in Europe. The first thing is to have a wall thick enough to allow the moisture to condense within it. Of course retaining walls, such as those which we have in our Swiss vineyards, are the best, because the soil that is supported by them stores a constant supply of moisture in immediate contact with them.

Stone walls are to be preferred to brick walls, but, in damp climates (England and the seacoast of Western Europe) I have seen good gardens in brick walls, especially in old ones. Limestone rock is to be preferred to granite because it is more porous; granite is rather cold but can be used for plants which like acid or silica soil.

We have a special wall for the more difficult plants. It is composed of one part tufa, one part limestone, and one part granite (protogynous), every part having its special flora.

The following plants do well in the granitic part of the wall: Parsley Fern (*Allosorus crispus*), *Androsace glacialis, imbricata,* and *Wulfeniana; Asplenium germanicum* and *septentrionale; Silene rupestris; Empetrum nigrum; Astrantia minor; Draba frigida; Gentiana frigida; Hutschinsia brevicaulis; Phyteuma hemisphæricum* and *pau-*

ciflorum;· Primula hirsuta, pedemontana, integrifolia, villosa, viscosa, Saxifraga aspera, bryoides; Sempervivum montanum; Senecio incanus, uniflorus; Silene pumilio; Thalictrum alpinum, etc.

Species that do better in chalk even in the tufa, which is the most porous of the stones, are: *Androsace Charpentieri, cylindrica, Haussmanni, hirtella, pyrenaica; Campanula Allionii, alpina, Moretiana, pulla, pusilla, Zoyzii; Draba aizoides* and *pyrenaica; Geranium argenteum* and *cinereum; Hutschinsia alpina; Phyteuma comosum; Primula auricula, carniolica, calycina, Clusiana, marginata;* the Saxifrages belonging generally to the groups Euaizoon and Kabschya; *Senecio leucophyllus; Silene Elisabethæ.*

The best and quickest way of making a wall garden is to plant it as you build. But this can be rarely done!

CHAPTER VII

THE ROCKERY

It is one thing to make a rock garden or a rockery in a natural setting, such as we have in a country like Switzerland, and quite another thing to make an artistic creation in a maritime or flat country such as we find in many parts of England and in the United States. Concerning the arrangement of rock work in England, Mr. E. W. Clayforth, the excellent translator of my *Alpine Flora,*[1] has very well expressed himself:

> Of the arrangement of rock work, that is, of the details of construction as opposed to the general plan, M. Correvon has written in another book, entitled: *Plantes des Montagnes et des Rochers;* and we English are, perhaps, wearied of such minutiæ, when even commercial catalogues presume to teach by a scratchy sketch an art that cost Mr. Robinson pages to explain, and which can only be learned in a school of personal, often of bitter experience. Flat pockets for surface-rooters, open ones for those that increase by offsets, long, narrow ones for running stolonifers, etc., may be good general principles, but to be applied with intelligence, since many other factors are involved, *e.g.,* the aspect and soil of the garden, the average rainfall and sunshine of the district. All depends upon a first-hand knowledge of place and plant, which alone can secure a harmony between the needs of the one and the capability of the other. But a word may be in season as to the

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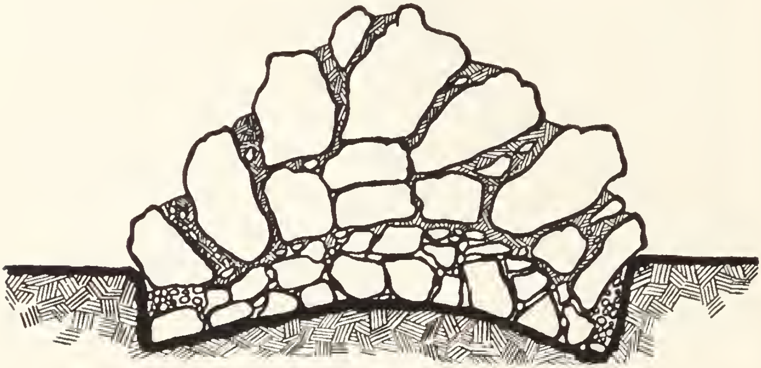
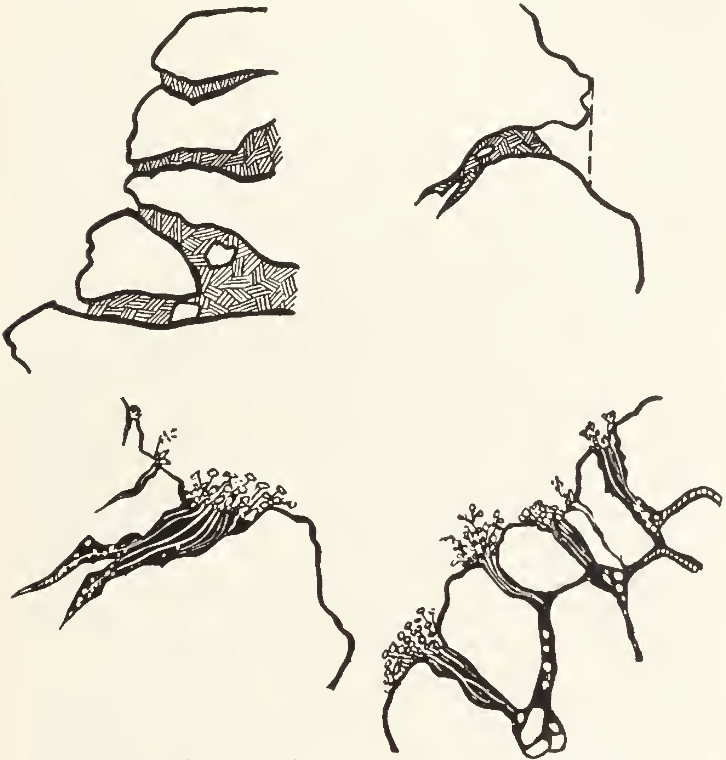
[1] *The Alpine Flora,* by H. Correvon, illustrated by P. Robert, translated by E. W. Clayforth, London, 1911.

general planning. First, the result should look natural. This will not be secured by making a servile copy of any scene in nature, if for no other reason than because one cannot then plant to a natural scale. The dwarfest Juniper would there out-ape a forest tree of nature, and *Thymus Serpyllum* outrival the mountain Rhododendron. By natural, it is meant that the laws of geology, which govern stratification, etc., must be obeyed, nor may granites, schists, and limestone be huddled in one chaotic mass. Arts must preside over it, three in chief; the geotechnic above mentioned; the horticultural, which will see that all is adapted for good growth; the æsthetic, which demands beauty. This brings one back again to scale; for, in beauty, proportion and harmony of line, unity of meaning in diversity of structure are greater than all effects of colour. Some there are even of alpine plants which are too stately or architectural in habit to be wisely admitted upon our mimic alp (for we may copy an upland pasture, though we may not build a tiny Jungfrau), where the little Junipers and Thymes will now be right in place; for just as the latter may not dwarf a mimic mountain, so may they not be crushed by the neighbourhood of *Gentiana lutea*. These majestic, herbaceous alpines must, alas, be something of pariahs, confined to the outskirts—Peris excluded from the Paradise.



Construction of rock garden on level ground.

All alpine gardens, whether in a single slope, or two facing slopes, or two ridges, or a hollow, are modifications, either by division or combination, of one or more valley forms. However simple in outline, monotony can be avoided by breaking the surface into tributary valleys or rocky cirques. Shelter from the biting spring winds must at any cost be given; best by the lay of the land; next best, by an old wall, which may be inartistic but is honestly utilitarian, and does not injure the plants; worst, by heavy shrubs or trees, which are directly injurious. All slopes so protected should



Rocks should be placed so as to catch water for plant roots.
(Upper drawings show improper placing; lower drawings illustrate rocks so placed as to direct water to plant roots in soil pockets.)

be open, airy, and gradual, articulated here and there with bold masses of homogeneous stone; the stratification of each slope must be similar.

A simple, but almost ideal, form would be a pair of ranges, one granite, one of chalk, each diversified with nooks and bays and crannies, the gentler, roomier slope facing the southeast. The upper end should be built up high, to guard off the northeast gales; and to retail the water feeding a stream in the underlying valley. Beneath the pond the valley should boldly fork and in each fork be built a moraine of either rock, with a hidden sluice connected with the reservoir above, to maintain in spring and summer a constant filmy overflow of water warmed by the sun, and to deny the same in the leaden days of autumn or of winter. Ambition would suggest a secret conduit along and under each watershed, breaking out where fancy moved into other regulative sluices, each controlling the humidity of its peculiar moraine. Does the reader enquire of this "moraine"? It is the arcanum of our cult, and Mr. Farrer is the hierophant in charming volumes which are destined to become classics of garden literature.

Now, here are some words of my friend, Mr. William Robinson:[2]

> It is not only those who make their "rock work" out of spoilt brick, cement, and perhaps clinkers that err in this respect, but the designers of some of the most expensive works of this kind. At Chatsworth, for instance, and also to some extent at the Crystal Palace, we see rocks not offensive so far as distant effect in the landscape is concerned; but, when examined closely, it might well be imagined that rocks and rock plants were never intended for each other's company, so bare are these of their best ornaments. They are, for the most part, pavements of small stones, huge masses of stone, or imitation rock, formed by laying cement over brickwork, and in none of these cases are they adapted for the cultivation of mountain plants.

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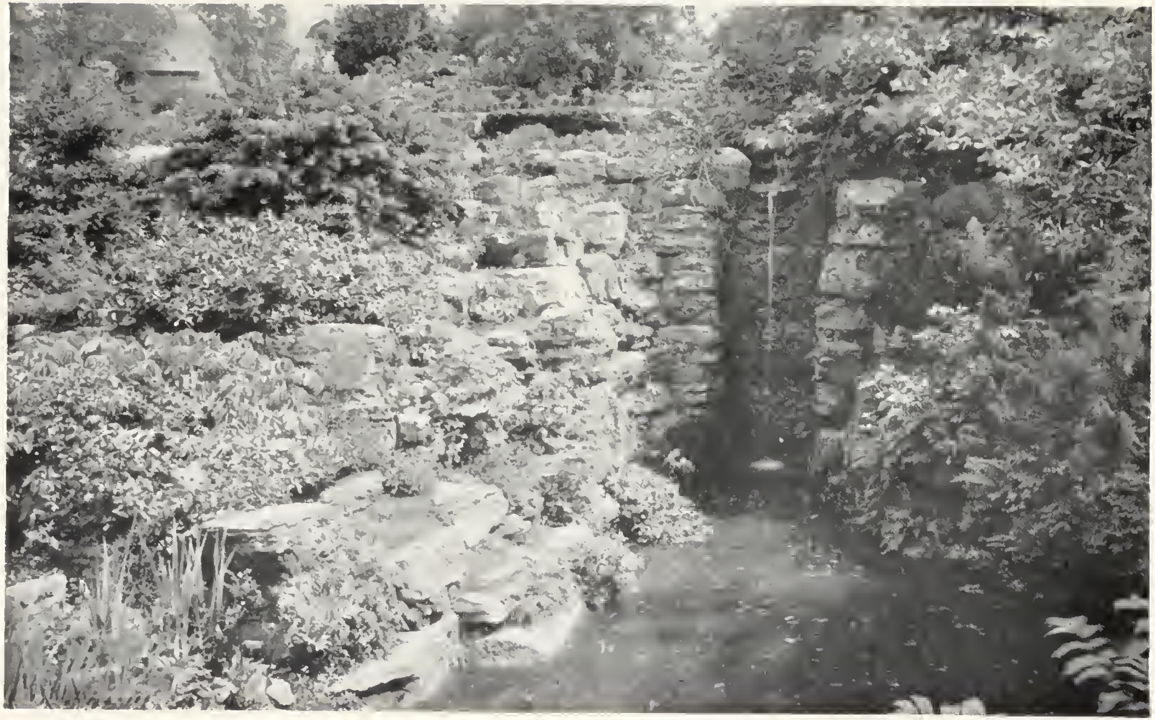
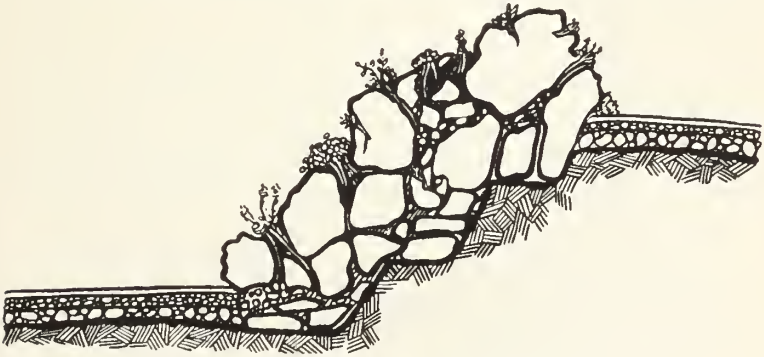
[2] William Robinson, *Alpine Flowers for Gardens,* London, 1903.



Courtesy, House and Garden

The lower pool and cascade on the grounds of F. Cleveland Morgan near Montreal, Canada.

It is possible to combine the most picturesque effects of which rocks are capable with all the requirements for plant growing; and it is easy to use the large stones and make bold effects, and leave at the same time level intervening spaces of rocky ground in which rock plants may thrive almost as well as on the many mountain pastures where we see them happy in the mountain turf.



Placing of rocks for a side-hill garden.

Position for the Rock Garden

The position selected for the rock-garden should not, as a rule, be near walls, or very near a house; never, if possible, within view of formal surroundings of any kind; and generally be in an open situation; and no effort should be spared to make all the surroundings as graceful, quiet, and natural as they can be made. The part of the gardens around the rock garden should be picturesque, and, in any case, display a careless grace, resulting from the naturalisation of beautiful, hardy herbaceous plants, and the absence of too formal walks and beds. The roots of forest trees would be almost sure to find their way into the masses of good soil provided for the choicer alpine plants, and thoroughly exhaust them. Besides, as alpine flowers are usually found on treeless and even bushless wastes, it is certainly wrong to place them under trees or in shaded positions, as has generally hitherto been their fate.

It need hardly be added that it is an unwise practice to plant pines on rock work, as has been lately done in Hyde Park and many other places. It will, however, generally be in good taste to have some graceful young pines planted near, as this type of vegetation is usually to be seen on mountains, apart altogether from their great beauty and the aid which they so well afford in making the surroundings of the rock garden what they ought to be. In small places, and in those where, from unavoidable circumstances, the rock garden is made near a group of trees, the roots of which might rob it, it would be found a good plan to cut them off by a narrow drain, descending as deep as, or somewhat deeper than, the roots of the trees; this should be filled with rough concrete, and it will form an effectual barrier.

Rockeries on the graves of our deceased are now becoming the fashion in the cemetery, at least here in Switzerland. We have in the cemeteries of Geneva a great many of these nice little alpine rockeries which are nursed with love and patience by the relatives and this is certainly more in harmony with the surroundings than the big and too blustering flowers. Mountain flowers on a grave speak to us in a higher language than any other plants. The elegance of a rockery is the best worship we can bring our defunct.[3]

I may add that I have recently received from New York a nice little illustrated handbook dealing with rockery construction. It seems to be just what the American gardener wants.[4]

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[3] See H. Correvon, *Nos cimetières,* Commission d'art public, Geneva, 1905.

[4] F. F. Rockwell, *Rock Gardens,* The Macmillan Co., New York, 1928.

CHAPTER VIII

CONSERVATION OF THE ALPINE FLORA

THE idea of building an alpine garden *in situ* in order to grow mountain plants in their actual environments and conditions is a modern one.

In 1885, during a vacation time in the Val d'Anniviers (Valais) at 2300 m. altitude, my boys and I made a small rock garden near the Hôtel du Weisshorn. My sons collected some plants from the surrounding mountains and I brought some from my garden in Geneva. This was really a nice collection, and thrived well. But the hotel owner gave the garden no attention and as the hotel some years after was burned, this first attempt at an alpine garden in Switzerland came to naught.

In 1889, with the assistance of some English friends, especially Sir John Lubbock (afterwards Lord Avebury) and Professor Romanes, the scientific heir of Darwin, I bought a little hill rising just above the village of Bourg-St.-Pierre on the Great St.-Bernard road at 1600 m. altitude. The Association for the Protection of Wild Flowers in Geneva helped greatly and an international committee was formed to take the garden under its protection. So we carried on. The alpine clubs of England, France, Italy, and Switzerland gave encouragement and there was really a serious attempt to acclimatise in the Alps the flowers of all the mountains of the world. We named the garden "La Linnæa," in honor of the Linnæan Society of London.

Opposition came from some botanists who could not see any useful purpose in botanic gardens, while others feared an alteration of the local flora through the introduction of foreign plants. It should be remembered that several botanists (and not the least among them either) have recorded new plants determined on specimens grown in gardens. Boissier in his splendid works, *Flora Orientalis* and *Plants of Spain,* determined a large quantity of new species that he brought home as seeds or as living material upon the plants he cultivated in his private botanic garden at Valleyres. The two botanists, Levier and Sommier, who travelled the Caucasus in 1890, brought back a lot of seeds of unknown plants, which they gave us to sow and upon which many determinations were published in their book on the Caucasian flora.[1]

Unable to maintain La Linnæa during the World War it was turned over to the University of Geneva, who continued it as a summer botanical laboratory for students who wished to work on the mountain flora. Some serious works have already been published from there, and I am now rewarded for the faith and confidence that was in me.

As for those who feared an invasion of foreign plants I can certify that, in the forty years that the garden has stood on its hill, nothing has escaped from it to the surrounding land. We also had the opposition of the peasants of the countryside who protested against introducing into a greenland, that was then a pasturage, masses of stones which are unproductive and "spoiled the ground"!

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[1] Sommier et Levier; Enumeratio plantarum anno 1890 in *Caucaso lactarum Petropolis et Florentiæ,* 1900, p. viii.

Our opponents said we were going *"contre vents et marées";* but, despite everything, we did inaugurate, in July, 1889, the first mountain botanic garden.[2] I was almost alone in the struggle and often discouraged; but am rewarded by the now universal love for such gardens and the fact that their usefulness from the standpoints of both science and art is recognised.

After the Linnæa, many similar gardens arose in the European mountains. The Rector Chanoux on the Petit St.-Bernard Hospice came to me one day while I was staying in Aosta and expressed his desire to have an alpine garden on the top of the "col" which relays Italy to France on the Petit St.-Bernard (2200 m.). In the latter part of July, 1897, "La Chanousia" was established there, and is now a scientific institution of the University of Turin. These two gardens are both on peat and granite.

The University of Lausanne accepted as a gift of the village Bex-les-Bains, as a garden for calcicole plants, the alpine garden which was founded in 1890 in honour of the Vaudois botanist, Thomas, in Pont de Nant (1250 m. altitude). In 1896 we founded on the top of the Rochers-de-Naye above Montreux (2000 m.) "La Rambertia," dedicated to the memory of our national poet and botanist, Eugène Rambert.

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[2] Some attempts had been made before in the Mont-Blanc range by Count Nicolaï and on the Blaser by the Swiss botanist, Naegeli, then at Munich.

Since that time numerous similar foundations have been established in various parts of Europe—Switzerland, Italy, France, Germany, Austria, and even Bulgaria. At Disko in Greenland (69° 15′ N.L.) the University of Copenhagen has built a house and made a garden as an observatory and laboratory for botanic research.

Similar units might be established in other countries, not only for their scientific possibilities but also for their sheer beauty. There is such a garden (as an accessory to Floraire) on the Jura, near St. Cergue sur Nyon (1000 m.) on the railway line leading to France,[3] where we are growing alpines for seeds. There may be found large beds of Gentians, of alpine Poppies, Primulas, Edelweiss, Campanulas, blue alpine Thistle, Silene, etc., presenting a beautiful sight in spring and summer. There is a little tea-house near the garden and people come from all around to take in the immense view (one of the best of Jura) and to admire the flowers.

When I visited the Pacific Coast in the spring of 1926, I was shown several places where some people hoped to establish some gardens like ours of the Swiss mountains; or even merely to develop some rock gardens in natural setting. The Paradise Valley (Mount Rainier) offers an ideal place for such a garden; but I was told that the "botanical authorities" feared the intrusion of foreign plants! I have here recited our experience in Switzerland, where we never had one single instance of invasion near our botanic stations. Whether the Arnold Arboretum at Jamaica Plain, Massachusetts, caused any upset I do not know, but I doubt it!

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[3] At La Chèvrerie, the last railway station before St. Cergue, and accessible to motors.

Such gardens have not only a scientific object but are wonderful schools for the education of the public. At Chicago, Santa Barbara, and elsewhere in the United States, I saw exhibitions of wild flowers made for the school children in the hope that they would thus become acquainted with the plants growing in the countryside and acquire respect for them. No doubt this is a very good way of diffusing botanical knowledge; but how much better it would be if the people could see the plants in a living state and in their own proper settings—if they could see how they grow and how they flower both in nature and in the garden!

When my friend Dr. H. Goudet and myself founded the Linnæa Garden, our first idea was to develop the taste for knowledge of the alpine flora, but above all to create and foster a feeling that would call for protection for the rare plants. In 1883 we organised in the Swiss Alpine Club (at Geneva) a committee for the protection of rare plants. This rapidly expanded and became an international association for the protection of wild plants.

We worked along that line for twenty-five years and ultimately scientific authorities of Switzerland founded, with the help of the Swiss Government, the *Naturschütz,* a powerful military-like organisation. We then dissolved our association.

In order to meet the demands of the foreign nurserymen who formerly came to our mountains to dig out rare plants, and took them away by thousands, our association for the preservation of native plants founded in 1884 in Plainpalais (Geneva) a committee to undertake the acclimatisation and culture of alpine plants. There we raised from seed as nearly as possible all the rare plants and offered them to the public, and especially to the foreign nurseries at cheap prices. It was the first attempt made in that direction and we had good results, not financially, of course, but from a conservation point of view. In 1893 I took over the whole thing and transformed the garden into a nursery for mountain plants. In 1902 we moved to Floraire.

Now, in both England and America, societies have been established for the protection of the wild native flora. The Selborne Society in England has done, and is still doing, a great work for the protection of and knowledge of the rare plants all over Great Britain; Lord Avebury was its president a long while. In the United States I was invited to visit the "office for wild flora protection" in Washington, D. C., and found there an admirable organisation having as its purpose the education of the people by pamphlets, lectures, coloured plates exposed in public rooms, in railway stations, etc., and teaching the public to respect the rare plants and to avoid their destruction. In the Rockies (especially in Oregon) there is now a large effort in that direction. Dr. Fenton and Dr. Benson are among the leaders at Portland.

The United States authorities were the first to protect the natural beauties by means of Reservation Parks. In 1832 the Senate declared that "the hot springs in the territory of Arkansas, together with four sections of land including said springs, as near the centre thereof as may be, shall be reserved for the future disposal of the United States and shall not be entered, located, or appropriated for any other purpose whatever." The first National Park was reserved in 1864—I mean the Yosemite Valley Reservation in California—and every year we see some new lands or parks being reserved for the public. I know of nothing more worthy of admiration. It is one of the noblest works of man to stop destruction and prove the respect and admiration for God's marvellous work. Things in the United States are wonderfully organised in that direction and we Swiss people cannot but admire that work. Of course that nation is young and strong and the future belongs to it. The universities, the laboratories, the libraries, the museums, the scientific organisations in all directions are, so far as I can judge, the best extant. And the gardening sciences and arts are taught in universities as well as in special schools. Graduates of these schools are very good gardeners, women as well as men, and they contribute their efforts to increase gardening knowledge and love of the country. I know it is said and believed that they are behind us in the artistic point of view and in the classical evolution of gardening. But they are progressing rapidly on the æsthetic phase, too, being in perpetual contact with old Europe.

At the University of Michigan at Ann Arbor I was the guest of a professor of gardening who is of Italian origin and certainly introduces something of Florentine and Tuscan art. It was the Lowthorpe School at Groton, Massachusetts, that called me to them to teach the students something about alpine plant culture. The author of the most popular and remarkable garden dictionary is Professor Bailey of Cornell University at Ithaca, New York, and I have seen in many of the high schools of America the greatest interest for horticulture. In many of the universities, especially in the Western part, and in California, great efforts are made for education along lines of practical agriculture and gardening.

FLORAIRE [1]

The garden at Floraire is, in fact, a horticultural establishment; it was born as a continuation of the *Jardin alpin d'acclimatation,* as that I had at Plainpalais since 1884 (see p. 60). I had acquired there the old nursery of Messrs. Paris frères, which was founded in 1830 for the cultivation and introduction of rare plants. There I raised alpine plants from

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[1] A *"Florarium"* was, according to the old Romans in the time of Plinius, a garden where flowers were grown.

Part of the collection of Sempervivums at Floraire.

seeds or cuttings and for eighteen years conducted experiments in the acclimatisation of mountain plants. I had already begun in 1875 on the old homestead at Yverdon (Vaud) to raise some alpines and, as already stated, at Geneva, in 1877, exhibited a group of rock plants acclimatised for gardens[2] which was the first exhibit of its kind ever made in Switzerland, and perhaps on the Continent of Europe. Messrs. Backhouse of York, England, had, I think, already done something of the sort, however.

An interesting fact is that my mother's father, who was a great lover of nature and a clever gardener, had founded that nursery in 1828 (more than a century ago) and it was a great sorrow for my mother when I moved it to Geneva. But it was necessary, alas, as the terrible hailstorm of 1877 destroyed the old garden establishment.

In Plainpalais (Geneva), however, we were too near the town; big houses were built all around us and took away light and sunshine; therefore we moved again here to Chêne-Bourg.

This place was originally a vineyard facing south, looking towards the Mont-Blanc range and the Salève. The slope of the soil is not too great and just right for the making of a picturesque garden, allowing the water to run gently from the top through the eighteen ponds that have been constructed. From Plainpalais we brought stones, rocks, gravel, and plants, and created, with the help of my son Fernand and of my gardeners, an original garden, half of it being a nursery, the other half presenting an agreeable sight to the eyes. We have some rockeries (not too many), numerous walls, some moor and peat beds, some shade or lath houses which we call "umbrosum." In a sheltered situation a bed was made for tender plants, those of the Mediterranean regions especially; we made an "Iridarium" for the Iris, a little roof garden like those in China, and even a small raft in one of the ponds for *Iris Kæmpferi.* We installed some sphagnum beds (see p. 61), some bog and water gardens, and prepared well-drained beds with special soil for the new introductions and rare plants which require special treatment.

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[2] *Catalogue des Plantes alpines et vivaces, cultivées dans l'établissement horticole de H. Correvon,* Yverdon et Lausanne, 1877.

But the most important part of this garden is the nursery where the alpines are acclimatised for cultivation in the lowlands, being either raised from seed, or from cuttings, or grafts, or imported from the wild. Half of the ground at Floraire is occupied by collections of herbaceous perennials which become every year more popular, and by rare shrubs.

During the first years, as we had grassy ground at the base of the slope, we transformed that into a Swiss meadow, planting in it collected bulbs, etc. (Leucojum, Galanthus, Scilla, Narcissus, Erythronium, Eranthis, Orchids, Primroses, Bluebells, etc.). This feature has been restricted little by little through the exigencies of the nursery so that our alpine meadow is now a very modest one. High and thick Arborvitæ hedges give shade to the beds we want to protect against our very intense sun, as our two "umbrosa" are not sufficient. We still have complete collections of Sempervivum, Sedum, and Saxifraga growing in special beds, and specially studied and nursed.

I try to maintain at Floraire a little experimental station open to the amateurs of alpine plant culture, and I have published from time to time more than twenty books devoted to the study and culture of alpines, of Ferns, terrestrial Orchids, Irises, etc., but none of them, or even all of them combined, have the value of what we call in French *"une leçon de choses"*—a demonstration lesson. At Floraire everybody may see and learn something, the doors being liberally open to the public.

Two specialties to which I would call attention are the collections of hardy Ferns and terrestrial Orchids, two classes of plants often neglected in cultivation. They are not really difficult to grow, and bring joy, freshness, and poetry into the garden.

Each year two catalogues, one of plants and one of seeds, are issued from Floraire and I feel in my declining years that this garden has accomplished something in the popularisation of wild plants and trust it may continue its service to gardens and gardeners long after its creator's days are ended.

CHAPTER IX

THE FERNERY

In "Beauties of Nature," Sir John Lubbock says:

> *"To the true lover of Nature wild flowers have a charm which no garden can equal. Cultivated plants are but a living herbarium. They surpass, no doubt, the dried specimens of a museum, but, lovely as they are, they can be no more compared with the natural vegetation of our woods and fields than the captives in the zoological gardens with the same wild species in their native forests and mountains."*

THE Ferns occupy an important place—a place of their own—in the ornamental garden. We ought not to use them as trivial articles of adornment, but should cultivate them for themselves, and for their own grace and beauty in the places which they seek and under the conditions they demand.

These timid dwellers in the great forests have nothing in common with the brilliant exotic flowers which have been introduced into our gardens and where they have supplanted—for a time only, because the old friends are coming back again—the beautiful hardy plants of former days. These two groups are as two separate worlds; in the one, grace and elegance of form are everything; while the other possesses in abundance colours and perfumes—vivid and brilliant attractions.

Alas, in the modern garden, the product (more or less happily) of the professional garden planner, there is no place for Ferns. People, too often, seek the gaudy, the startling, the brilliant. Although not subject to the tiresome rules which governed the gardening of our forefathers, the "gardener's gardens" of today are no more natural. Their formal style, their flower beds of one or many colours, cut out as with a punch from a turf of velvet where every poor wild plant is extirpated; the multiform arabesques copied from the Italian Renaissance; the massive shrubberies on which a certain form is imposed according to the rules of convention—leave no place for the plants of our woods. In the well-planned parterre, thanks to the clever combinations of regular forms worked out in the drafting office, there is no room for the imagination of the artist or the poet. A simple rock adorned with wild flowers is out of tune, and becomes a blemish. "Mosaïcultures" (abominable neologism which our French dictionaries do not recognise) are the order of the day and may be seen even in our horticultural exhibitions.

Nevertheless, let us be fair; a movement of reaction begins to assert itself, and is gaining the support of various art societies. It is forty years ago that we first cried in the wilderness, and the wilderness is beginning to return echoes. Our commission of public art at Geneva, the *Heimatschütz,* is sounding through all Switzerland, to whomsoever is willing to understand it, the call to recognise beauty and truth. In Belgium there is the *Société du Nouveau Jardin Pittoresque,* whose object is precisely to introduce into the art of the garden the idea of natural scenery. And much may be expected, for Belgium is close to England, where people follow their own fancies, and scoff at the rules and conventions of the architect-gardeners. And that is what makes the beauty, grandeur, and variety of the gardens across the Channel, which sound so much more than ours a personal and natural note.

The Ferns have their especial place in every garden in which reigns the love of the picturesque and the natural. In such a garden, whether it be large or small, park or terrace, there is always a wild shady corner, which the daughters of the woods will transform quickly into a sanctuary of flora—a sanctuary full of grace, elegance, and mystic beauty.

Have you anywhere a cool and shady place where you do not know what to plant? Make it into a fernery. For that purpose collect some old tree trunks or rocks, which you will arrange upon the soil as naturally as possible; model your emplacement in Nature's fashion; improve the soil by bringing in sand if it is too heavy, or loam if it is too light, and above all bring in plenty of leaf mould, which is for Ferns the one essential thing. If you can possibly do so, convert one corner into a bog for the swamp-loving species, and provide chinks between the rocks for the rock Ferns; and plant the numerous, varied, astonishingly vigorous species of our temperate regions in such a fashion that the species with persistent fronds alternate with those which die down each autumn. Enliven all with a little colour—with the wood Orchids (*Orchis bifolia, fusca, maculata, mascula*), with Lilies (*Lilium martagon, pyrenaicum,* and the Asiatic and the North American species), with Toothworts (*Dentaria bulbifera, digitata,* and *pinnata*), with Daffodils, Primroses, Periwinkles, Scillas (above all the delightful *Scilla nutans* of the English woods), with Troutlilies (*Erythronium dens canis*), with Cyclamen (*C. Coum, europæum, hederæfolium*), with Cypripediums, and many others of those plants, suitable for cultivation in the shade. (See p. 43.)

In the garden of which I dream there are Ferns, to some extent, everywhere. They are under the trees, along the edges of the water, in the clefts of old walls, as well as in the sunny rockery (for there are species which seek the sun, and these are not the least beautiful [1] and also in isolated groups in the shaded places about the lawn.

The Ferns are an important element in vegetation and represent one of the oldest forms of plants. In the carboniferous period, when the sun's rays did not reach the earth, the Ferns were very big trees covering part of the world with dense forests. Now, they are humble plants, imploring the protection of

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[1] There are numerous saxatile and even xerophile Ferns which one may find growing on sunny exposed walls or on barren slopes. I found in South Switzerland, in Italy, in the South of France, in Spain and especially in California and near to St. Louis in America, a large number of exceedingly elegant Ferns exposed to the strongest sun. But we must never forget that the rocks are an element of refreshment and that in such conditions as we see them moisture is not wanting. Under such conditions the plant can resist drought for a long time. In my first book on Ferns, *Les Fougères Rustiques,* Genève, 1890, p. 57, I record an instance of *Ceterach officinarum* retaining its vitality two years in an herbarium, and reviving after that period.

other trees against the sun's rays and (some arborescent species from the Southern Hemisphere excepted), none of them recalls a tree! They have no flowers but seedlike bodies called "spores," which are contained in little hollow cases of singular construction, the spore cases or "sporangia." These are grouped together in clusters called "sori," of various form and generally on the under surface of the "leaves." These leaves cannot properly bear that name, however; they are "fronds" and may be compared to branches bearing the fructifications; they are divided and more or less subdivided into small segments called "pinnules." Some Ferns have their fructifications in clusters; some have them at the end of the frond; and some have separate fertile and barren fronds. The stem we shall call a "stipe" to continue the technical terminology.

The nomenclature of Ferns is greatly confused in gardens, but the system of Hooker's *Synopsis* is followed here.[2]

The genus ADIANTUM provides us with an absolutely hardy species. A. PEDATUM, American Maidenhair of North America and the Himalaya Mountains, is one of the most graceful plants. Its pinnules are gracefully cut into ten to twelve pairs of opposite segments in the form of a horseshoe spread at the top of a slender black stem 40 to 60 cm. high. It requires porous and cool soil and shade or half shade. It is the true Maidenhair; also called "Canadian capillary," from which the syrup was made. It is the glory of the woods in the northeastern United States. I saw it near Groton, Massachusetts, in large masses, carpeting the ground of the damp woods, in company with *Onoclea sensibilis,* Trillium and *Mitchella repens,* and it was a beautiful picture, indeed. The so-called Klondike variety, which never came from the Klondike at all, has nonstoloniferous roots and narrow pinnules. The type has running roots and increases rapidly if planted in a well-drained situation in peat or leaf mould.

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[2] The following works were consulted for this chapter:
C. T. Druery, *Choice British Ferns,* London, 1888; H. Correvon, *Les Fougères Rustiques,* Genève, 1890; H. Durand, *Wild Flowers and Ferns in Their Homes and in Our Gardens,* New York, 1925; *Field Book of Common Ferns,* New York, 1928; Hooker, *Synopsis Filicum,* London, 1864.

A. capillus-veneris, Venus'-Hair. Haunts walls and damp rocks in the Mediterranean regions and in the Southern United States. It is found in West Switzerland in two interesting colonies; nevertheless the species requires a well-sheltered position or a winter covering. It grows well in the vicinity of damp rocks and especially tufa.

ALLOSORUS. See *Cryptogramma.*

ASPIDIUM (POLYSTICHUM). A genus very rich in ornamental species with persistent, stiff, and dark foliage.

A. acrostichioides. Christmas Fern. Of the United States; 50-90 cm. high; fronds brilliant shining dark green; once pinnate, the fertile being noticeably taller than the sterile.

A. aculeatum. Hard Prickly Shield Fern. Europe; 40-80 cm.; brilliant dark green; one of the best and the most vigorous of Ferns; hard texture; fronds broadly lanceolate.

A. angulare. Soft Prickly Shield Fern. Southern Europe; 30-60 cm.; dull dark green. This species has a multitude of forms and varieties, many of which are among the most elegant of

Ferns. At the home of a horticultural specialist near Manchester, England, I saw a collection so large that I could hardly believe my eyes. The catalogue of this specialist [3] which is now before me lists 74 different varieties of this single type. The most famous are var. *proliferum* of Tasmania; *Wollastonii,* and the delicate *plumosum* of Japan.

A. Braunii. Eur., Asia, N. Amer.; is a dwarfer angulare (50 cm.) with sombre and dull foliage.

A. laserpitifolium. Japan; fronds 30 to 40 cm., triangular, persistent, extremely decorative, of a brilliant dark green, brownish red in the new portions.

A. lobatum, common Prickly Shield Fern. Closely related to *aculeatum;* has long fronds of a beautiful luminous dark green, very decorative. They make the best possible effects in the picturesque garden in winter. It grows in situations similar to *aculeatum.*

A. Lonchitis. Holly Fern. Alpine plant of 40 to 50 cm. at most; narrow dark green fronds; it grows in the high zones in woods or between Rhododendrons till 1800 alt. in Eur., As., and N. America.

A. munitum, Pacific-Christmas Fern. From West. U. S. A.; a much bigger, stiff *Lonchitis,* even more sombre; primules very elongated with a large ear at the basis.

A. setosum. Japan; fronds 30 to 50 cm., brilliant green, hairy. Not quite hardy with me at Floraire and it fears lime.

A. (*Pycnopteris*) *Sieboldi.* Japanese species with robust stem, persistent fronds (15 to 25 cm.), not much divided, thick, leathery, of a slightly greyish green; on rocks and in half sun. Not quite hardy.

ASPLENIUM. A numerous genus with us, comprising the most widespread species, and a great many saxatile ones especially suited for the rockery or wall.

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[3] Mr. Birkenhead, the specialist in question, is dead and his garden establishment with him, alas!

A. acutum. Southeastern form of the following species:

A. adiantum-nigrum. Black Maidenhair Spleenwort. Southern Europe, Mediterranean regions; persistent fronds of 30 to 50 cm., brilliant dark green, with black stipe; loves rocks and protected places; dislikes lime. Numerous forms and varieties.

A. angustifolium. Narrowleaf-Spleenwort. N. America; fronds of 50 to 80 cm., clear green, narrow and not persistent; porous, moist soil.

A. Ceterach (*Ceterach officinarum*). Scale Fern. A tiny mural Fern which can be distinguished at first glance, as the back of the fronds is covered by brown chaffy scales; evergreen, forming thick tufts. The fronds, when fresh, are thick and fleshy but later lose all appearance of life and look as if dead; then, suddenly, with the slightest rain of a few minutes, they recover and look as luxuriant as ever. Good for dry walls and very sunny places on lime or granite. It grows in S. W. Eur., in North Africa, and on the Himalayas. In England it is found up into Somerset.

A. ebeneum (*A. platyneuron*). Ebony-Spleenwort. This is the *A. trichomanes* of North America but much more developed than the European type; a slender dark stipe 50 to 60 cm., bearing regular alternate, very rigid pinnules. Likes a black leaf mould and cool situation.

A. fissum. Thin-Spleenwort. S. E. Eur.; fronds of 10-15 cm. very finely cut, the most graceful of the Spleenworts; when I found it in the limestone débris near the Col de Tende, I fell in love with it as the most exquisite of the Ferns. It is thinner than the Parsley Fern and has gay green foliage, hardly 10 cm. high, and grows in dense tufts in the full sun on the limestone moraines.

A. fontanum (*A. Halleri*). Smooth-Rock-Spleenwort. Fronds 15 to 25 cm., persistent, bright or dark green, very finely divided. One of the best for sunny rocks and walls; many forms and varieties; S. and W. Eur. on chalk.

A. Foresianum. This is a W. Eur. Fern, intermediate between *A. fontanum* and *lanceolatum,* growing on granitic rocks.

A. germanicum (*A. Breynii*). Alternate Spleenwort. S. Eur. Hybrid of *A. trichomanes* and *septentrionale;* rare and interesting; dislikes limestone, and can stand full sun on rocks.

A. Goringianum pictum. Beautiful multicoloured species from Japan; dislikes severe cold; the fronds are fugaceous, narrowly oblong to 15-40 cm.

A. lanceolatum. W. Eur.; evergreen, fronds of 30 to 40 cm., dark green; rare; prefers rock and dislikes lime.

A. lepidum. Rare and quite minute plant from the E. Eur. limestone cliffs, resembling a diminutive Wall Rue. We keep it on a sunny tufa wall.

A. marinum (see Spleenwort). Maritime rocks; hard, thick, and persistent fronds of a lively and brilliant green; 30 to 50 cm.; cold house or orangery, or better still a warm shaded corner of a protected rockery which is sheltered in winter.

A. montanum. United States; tiny species midway between *A. ruta-muraria* and *A. adiantum-nigrum.*

A. Novaboracense. New York Fern. Grows in extensive clumps; pale green fronds 60-120 cm. high, deeply cut into small pinnules. Rich moist leaf mould in the Northwest U. S. and in Canada.

A. Petrarchæ (*A. glandulosum*). Delightful little glandular Fern from the Mediterranean regions, with the appearance of a glandulous *Trichomanes;* prefers a sunny place on rocks and dislikes severe cold.

A. ruta-muraria. Common Wall Rue. A great number of varieties exist; must be planted on rocks in full sun.

A. Serpentini. A dear little thing, being a constant form of *A. adiantum-nigrum* with orbicular broad pinnules; in the serpentine stone in E. Eur., France, England.

A. Seelosi. Minute Wall Rue. Miniature Fern. 5 to 8 cm.

high, with very small fronds, coming from the Dolomites of Tyrol; a cleft in a wall or a rock suits it.[4]

A. septentrionale. Forked-Spleenwort. From the granitic mountains of the Northern Hemisphere; a curious Fern with narrow fronds cut into three or four linear strips, dark green, 8 to 10 cm.; absolutely a lime-hater; sun. When found in limestone countries it is always on erratic granites or on morainic ground.

A. thelipteroides. Fronds of 50 to 60 cm.; yellowish green; likes a woodland soil rich in humus; N. Am.

A. Trichomanes. Common Maidenhair Spleenwort. A common plant, of which there are numerous varieties.

A. viride. Like the preceding species, but with green stipe instead of black; it is a real mountain plant and likes a northern wall.

ATHYRIUM (*Asplenium*) *felix-fœmina.* Lady Fern. Distributed all over the Northern Hemisphere. One of the commonest and finest Ferns. An elegant plant with splendid habit of growth; the fronds are very fugitive and yellowish in colour. It grows in the woods and there are a great many forms and varieties; English catalogues count them by hundreds. It is the most finely cut of wood Ferns, and one of the most popular. Thrives in all places that are lightly shaded and cool, and grows with great vigour. The best varieties are: *cristata, Frizeliæ, plumosa, Victoriæ.*

A. crenatum. From the boreal regions of Europe and Asia; a strong and stiff plant, 50 to 60 cm. high; dark, triangular fronds, dull green, very finely divided; stipe yellow. Spongy or moor-peat soil in a fresh situation.

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[4] A good illustration of it is given in the *Atlas de la Flore alpine,* Vol. V, Pl. 492.

A. rhæticum (*alpestre*). Botanically different but has same general aspect as *A. filix-fœmina.*

BLECHNUM. See LOMARIA.

BOTRYCHIUM *Lunaria.* Grape-Fern or Moonwort. North Asia, N. Africa, N. America to the southern Andes. More curious than beautiful. In spring puts out a sterile frond at a mid-height of a stem of 10 cm.; this frond is glabrous, brilliant green, and divided into thick pinnules of semilunar form; from the base of this sterile frond rises a small yellow-green bouquet which represents the fertile frond. A mountain plant, found in high meadows of the Northern Hemisphere, and in Tasmania; must be grown on the moraine or in an alpine meadow.

B. ternatum, rutæfolium, and *virginianum* of North America. Differs from the foregoing in the form and the pattern of division of the sterile frond. Should be cultivated in a light, moist soil, in half sun or in the moraine.

CAMPTOSORUS *rhizophillus.* Walkingleaf. One of the most curious Ferns. Guided by Dr. Wherry, I found it once near Washington, D. C., growing on old tree trunks in deep shade. Its characteristic is the forming of new plants at the tips of the arching fronds as a result of their taking root where they touch the soil. In outline the leathery, glaucous green fronds are heart-shaped at the base, entire, and tapering to a long, slender tip. They form roundish tufts not higher than 5 cm. Must be planted in deeply shaded places of the rock garden or in the fernery, under tall-growing species, in pure peat.

CHEILANTHES *fragrans* (*C. odora, suaveolens*). A little rock Fern, with ciliate fronds of an exquisite delicacy, which haunts the rocks and walls of the Mediterranean regions. Dislikes severe cold, and requires shelter in winter. Can be left without watering a long time and it recovers as well as Ceterach.

There are American Cheilanthes which can be planted on hot and sheltered places of the walls or on the rockery, as well as cultivated in pots. I was very interested by one splendid Cheilanthes of California. Jepson gives eight different kinds for that state alone; here is the list of the American Cheilanthes which are grown in gardens:

C. californica. Triangular fronds, 15 to 20 cm. high; bright green, finely and deeply cut.

C. Cooperæ. Closely related to our *C. fragrans* but still thinner and more hairy; reaching 25 cm. high.

C. gracillima. Lace-Fern. Very tomentose; downy.

C. lanosa. A delicious little thing I found once near St. Louis, Mo. Put it in my bag and forgot it for six weeks, when I found it apparently quite dry and dead; but planted at once it revived. Very downy and tomentose, with fronds 20 cm. high, stiff and rigid and, as with all these American Cheilanthes of milder climate, must be grown on sunny, sheltered walls or in pots.

CRYPTOGRAMMA (ALLOSORUS) *crispus.* Parsley Fern. Highest granitic mountains of Europe and Asia to 2800 m. altitude; a small tufted Fern with bright green foliage; sterile and fertile fronds different. Must be cultivated with us in the *tourbière* or moraine, in sphagnum, or under lath shade. The Mont-Blanc range and its beautiful protogine granite suit it especially and it is there very luxuriant.

CYRTOMIUM. This genus, very close to Aspidium, is essentially Japanese and not entirely hardy in our climate. It has thick, leathery fronds, dark green, shining and brilliant in *C. falcatum* (50 to 80 cm. long), which is one of the most decorative of Ferns; clear green and veined in *C. Fortunei.* These two species, with *C. atratum* and *C. caryotideum,* form a group of great beauty, much appreciated for decorating rocks, undergrowths, etc.; rather tender and must be protected in winter. They are the best Ferns for the apartment or the orangery and withstand the dryness and temperature of heated dwellings.

CYSTOPTERIS. Bladder Fern. A genus of great elegance and extraordinary delicacy of design. They include some of the finest and most graceful Ferns, most serviceable in the ornamentation of walls and rockeries, being almost all of saxatile nature.

C. alpina (*C. regia*). From the moraines and limestone mountain débris in Central and South Europe; very finely cut form of *fragilis.* Moist old walls or half-shaded place in the rockery. *C. sempervirens* is an evergreen variety of it.

C. bulbifera. Berry-Bladder Fern. N. America. One of the most vigorous and the most ornamental of Ferns. Narrow elongated fronds, 50 to 80 cm.; rather fugitive, of a clear green with a rose stipe and numerous bulblets attached to the under side of the frond, which, falling to the ground, there reproduce the plant and invade rapidly the ground. Excellent for undergrowth, cool places, old walls, and humid, stony corners.

C. fragilis. Brittle-Bladder Fern. A pretty, fine Fern of vineyard walls or alpine rocks; fronds very finely divided, 20 to 50 cm., with yellowish-brown stipe. Rocks, walls, stony woods. Not rare in the mountains of the Northern and Southern Hemispheres, growing always on chalk. There are many varieties, of which *C. Dickiana* with broader pinnules and shorter fronds is the best.

C. montana. Mountain-Bladder Fern. Still more finely cut than the others; it is a veritable *"point de Venise"* of the most delicate kind. It has, alone among the Cystopteris, a triangular frond and grows in mossy woods, among the limestone rocks of the mountains of Europe and North America. We cultivate it in the moraine, or better still in pans in turf or light leaf mould. Planted on the north side of a tufa wall it does very well. *C. Sudetica* is a German form of it with longer fronds and shorter pinnules.

DICKSONIA *punctiloba.* The Boulder-Fern. N. Am.; a strong-growing plant, 50-80 cm. high, with bright green fronds rising from a creeping rootstock and twisting in every direction, forming dense clumps. Easy to grow, wanting only good leaf mould and shade.

GYMNOGRAMMA *triangularis.* Gold-Fern. A strange and delicate Fern of the Rockies with fronds 10-20 cm. high, triangular, deeply cut, dark green, above whitish, pulverous below, and a dark brown stipe. Grows on damp rockeries in California. We have great trouble with it here because it never can be watered from above.

LASTREA. See NEPHRODIUM.

LOMARIA *Spicant* (Blechnum). Hard Fern. A curious lime-hating Fern from the mountains of the Northern Hemisphere, forming there large colonies many metres in diameter. Thick, tough fronds, of a dark shining green, leathery, fertile, fronds attaining 70-80 cm., the sterile ones lower. Very many varieties. Acid soil, under lath shade, or in woods.

LYGODIUM *palmatum*. Climbing Fern. One of the rarest; and it was a lucky day when I found it in the peaty woods of Groton, Massachusetts, framing the Moccasin flower. Very difficult to acclimatise it here. It attains 1 m., is climbing and has light green fronds, slender, not much foliate with large ovate pinnules. It wants acid soil or black surface soil scraped from the hollows under oak trees and a perpetual mulch of half-decomposed oak leaves.

NEPHRODIUM. One of the most important genera, sometimes called *Lastrea* in gardens. Nearly related to Aspidium, but fronds not persistent.

N. æmulum. Hay-scented Buckler Fern. From South and Western Europe, nearly related to *N. dilatatum* from which it differs by its smaller proportions, never exceeding 60 cm.; an elegant Fern with triangular fronds, scaly stipe, and very finely cut deep green foliage; the whole plant is covered with fragrant glands. Good for shady and damp borders, woodlands, or big rockeries.

N. Boottii. Natural hybrid *N. spinulosum* and *cristatum*.

N. cristatum. Crested Buckler Fern. Differs from the Male Fern by its narrow lanceolate very upright fronds, reaching 60 cm.; the stipe is proportionally stout and naked to the middle, light brown; pinnules crested on the margins. Marshes and damp meadows in cold countries from N. Eur. to Eastern N. America.

N. decursive-pinnatum. A low-growing plant from China and Japan; fronds 25 to 30 cm.; the pinnules are united by a green blade which gives the stipe the aspect of being winged; a nice Fern forming large clumps of gay green colour. Escaped from gardens and naturalized near Locarno and Lugano. It likes peat and half sunny, sheltered position.

N. dilatatum (*N. spinulosum var. dilatatum*). Differs from spinulosum by its more finely and deeply cut pinnules and narrow stipe; fronds wide spreading, almost triangular in shape, lively green. Deep soil rich in humus. Woods of the mountains of the Northern Hemisphere.

N. filix-mas. Male Fern. The most common of our Ferns after the Pteris and contrasting with the Lady Fern by its robust habit. A strong-growing plant; shiny pale green fronds 50 cm. to 1.20 m. long, dark green. The stipes are densely scaly and the pinnules coarsely dentate. Very common all through the Northern Hemisphere and in Java and South America. Has a number of forms and varieties, the best being *Barnesi, Bollandiæ, crispum, cristatum, grandiceps, linearis, pumilum.* The easiest Fern to cultivate.

N. fragrans. Fragrant Fern. Dark brownish foliage, with very obtuse pinnules and shining leathery frond, erect, 20 to 30 cm. A small form of *rigidum* from arctic Asia and America. It likes leaf mould mixed with limestone.

N. Goldianum. Goldie's Fern. A large species, attaining sometimes more than 1.5 to 2 m. with brownish, hairy stipes naked from the base up to 30-40 cm.; fronds triangular, light blue-green colour. Excellent under trees. It grows in the vicinity of New York in damp and dark woods. Easy to grow in moist soil and shady situation.

N. marginale. Evergreen-Wood Fern. Graceful and slender plant with fronds 60 to 70 cm., oblong, lanceolate, leathery, pale glaucous; sometimes persistent in winter; stipe green with green scales. Wants a light soil and a half-shady position. Canada and North America.

N. montanum (*N. Oreopteris*). Mountain-Buckler Fern. A fine Fern with thick, erect stipes, regularly striped; fragrant (apple odour); yellowish fronds growing to 50 cm. A strong, hardy plant of the mountains of Europe (from arctic regions to the Pyrenees) and Japan. Good for underwoods and big rockeries in well-drained ground.

N. novaboracense. A North American species distinct in form and of a clear green hue; 30 to 40 cm.; loose, moist soil or moraine.

N. Pseudo-Mas. Hard Male Fern. Distinct from the Male Fern by its almost evergreen fronds, rather flat, the pinnules very slightly toothed; colour bright yellowish green in the young state, deep and shining green later. A great number of varieties: *angustatum, crispum, cristatum, gracilis, ramosissimum, remolens,* etc. Same culture as *filix-mas.*

N. rigidum. Rigid Fern. Characteristic of the limestone piles on calcareous mountains in S. Eur. Forms dense tufts or colonies exposed to the full sun, but its rootstock is deeply sunk between the rocks. The fronds erect, short (25 to 40 cm.), dark green, exhaling a strong apple perfume. Grows in the sun and in limestone gravel. *N. fragrans* is simply its American form.

N. spinulosum. Broad Buckler Fern. A very compound-leaved Fern forming a large, tufted stock with broad arched, dark green deciduous fronds reaching 1 to 1.5 m.; they are broadly lanceolate or triangular and the very numerous pinnules are divided and subdivided, the whole looking very graceful. It grows in damp and shady woods or in sphagnum marshes all over the Northern Hemisphere and only in cold regions. Give it a spongy leaf mould or a shady underwood.

N. Thelipteris. Marsh Fern. Very stoloniferous and creeping plant bearing two kinds of fronds, the sterile ones reaching 80 cm. and the fertile 50-60 cm.; widely spreading by stolons. Plant in sunny marshes or in damp woods. Widely distributed in both hemispheres. *N. dimata* (*Thelipteris simata*) is an American form growing in the Eastern states.

NOTHOCLEANA (*Gymnogramma*) *Marantæ.* This is one of the most curious of European Ferns; found on damp rocks, where it forms very large tufts—real colonies; its fronds (10 to 25 cm.) are dull dark green on the face and rusty brown on the reverse side. It must be planted in a warm corner of the rockery and protected in winter.

N. nivea. U. S. A.; has exquisite delicately cut fronds, 10 cm. long; the dark and smooth stipe bears elegant segments green above and powdered white below. Sunny hills; not quite hardy with us.

N. Vellæ (*lanuginosa*). S. Europe. A beauty; covered with long down; wants sun and granitic rock.

ONOCLEA *germanica.* See STRUTHIOPTERIS.

O. sensibilis, Sensitive Fern. Glabrous, light green with two kinds of fronds, sterile ones 30 cm. high, deeply cut into large teeth with wavy margins, the fertile shorter (20 cm. high) of very different shape, stiffly erect and covered with small green fructifications. A true acid soil plant which I saw in large colonies in the woodlands of Massachusetts, in rich moist peat mixed with the Maidenhair and the Moccasin flower. A beauty in the garden when grown in peat and in shaded places. Very stoloniferous and invading.

ONYCHIUM *japonicum.* A very thin and finely cut Japanese Fern, with elegant fronds 15-25 cm. high. Furnished with narrow and shiny pinnules. Not quite hardy here, and must be protected or planted in a sheltered corner of the fernery.

OPHIOGLOSSUM *vulgatum.* Adder's-Tongue. Has more the aspect of an Arum than a Fern; its sterile frond, not divided, glossy, occurs at mid-height of a stalk of 20 to 25 cm., from the centre of which rises the fertile spike, erect and stiff. Damp meadows of the Northern Hemisphere. Cultivated in the marsh, the *tourbière,* or the moraine.

OSMUNDA. A curious and very distinct group belonging to peat marshes or damp woods and always in acid soil.

O. cinnamomea and *O. claytoniana.* Cinnamon Fern. Two North American species which may attain more than a metre height and whose sterile fronds, which are most beautiful, are highly developed. Must be cultivated in cool places in deep soils rich in humus.

O. regalis. Royal Fern. Glabrous plant of stately and noble aspect; the fronds are wide and of a clear green (1.5 to 2 m. at times), elegantly cut, having at their extremities the fruiting organs in the form of brownish-green panicles. Grows in the bogs of Western and Southern Europe, Africa, Asia, and America. Japan[1] gives us *O. gracilis,* a smaller and more graceful form of the Royal Fern with brown-red stems, and there are cultivated a rather large collection of varieties of the type, of which the most curious is *O. regalis cristata.* In gardens they want large space, spongy, acid soil, and half shade.

PELLÆA. Embraces some characteristic and most elegant Ferns of North America, and I am never tired of them. Gracious are their thin and elegant fronds with dark shining stipes and bluish-green verdure. All grow on dry, exposed rocks or on gravelly, bare ledges. And, at first sight, you would never believe that some of them are Ferns.

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[1] See Terrestrial Orchids of Japan in *Gardeners' Chron.,* September 8, 1928, p. 186.

P. andromedæfolia. Coffee Fern. Grows on the California rocks up to 1500 m. altitude and is a very stiff plant, loose, evergreen, the fronds ascending to 50 cm. and the stipe being very hard and thin. Looks somewhat like a minute shrub and wants a sheltered and sunny position on a rockery or in a wall.

P. (*Cryptogramma*) *densa.* Oregon Cliff Brake. Densely tufted 10-20 cm. with dark brown stipes, bearing pinnules 3-5 cm., ovate-oblong, entire in the fertile fronds, serrate on the sterile. A nice little plant of bright green colour which I found in large patches near Ukiah, California. We must shelter all these treasures in Geneva, and grow them in a greenhouse; but they are half hardy or even hardy in milder countries like England and the West of France.

P. ornithopus. A lower plant, still more rigid and erect stipes, wiry, mahogany colour, 30 cm., very small dark green pinnules; looks like an Asparagus and grows on the driest rock summits in the Mohave Desert, etc.

PHEGOPTERIS. See POLYPODIUM.

POLYPODIUM. A very important genus furnishing numerous exotic and greenhouse species.

P. calcareum. See *P. Robertianum.*

P. Dryopteris. Oak Fern. From Europe, Asia, America, and Africa in the stony rubbish of mountain woods. Fronds triangular, 15 to 30 cm., weak, yellowish green, glabrous. Peat or leaf mould, half sun.

P. hexagonopterum. Winged Beech Fern. North America. Fronds elongated, triangular, 25 to 30 cm., slightly hairy, with pinnules decurrent on the petiole, which is in consequence winged.

P. Phegopteris. Beech Fern. Closely related to the preceding species, of which it may pass as the European and Asiatic form; petiole not winged; fronds short, triangular on long stems, slender and hairy. These two species require a spongy soil that is not limy. Lath house, stony woods, or still better in a shaded moraine or in shady places on the rockery.

P. Robertianum (*calcareum*). Limestone Polypody. Grows on walls and in limy gravel beds in Europe and North America; near to *P. Dryopteris,* from which it is distinguished by its firm, dry fronds, hairy underneath. Rockery or wall. Likes lime and sun.

P. vulgare. Sweet-root Polypody, Wood-licorice, etc. Distributed throughout temperate countries over all the globe and even covering the thatched roofs of Eastern Europe. Rhizome fleshy, of a sweetish taste; fronds persistent, leathery, dull dark green, of an elongated oblong shape. Rockery or open ground; half shade or sun. There are a great many varieties cultivated, some of which are marvels of beauty, *e.g., Cambricum, Cornubiense, cristatum, elegantissimum, plumosum, trychomanoides,* etc.

PTERIS *aquilina.* Imperial Fern, Great Eagle, Bracken, etc. In some countries, especially Macedonia, this Fern covers immense tracts which it renders absolutely sterile because of its creeping rhizomes. Its fronds are highly developed, reaching at times 2 m. in height, ovate, triangular. Though found wild over the whole surface of the earth, it is very difficult of acclimatisation; but once introduced it is difficult to get rid of. Should not be put into small rockeries. At Floraire we have it planted in the lath house (with difficulty, it is true) and it has invaded us without possibility of being destroyed. This is the only Fern which can be utilised as food. One gathers the young shoots like Asparagus, ties them in a bundle, and puts them in a basin of water with a little powdered cooking soda; they are allowed to steep four hours in the water; then they are boiled like Asparagus and served hot with melted butter according to *Gardening Illustrated,* June 4, 1913. But I should not try it!

I have said that *Pteris aquilina* is the only Fern which may be used as food, but it should not be concluded from this that the Ferns are wholly lacking in utility. *Polypodium vulgare* is employed in pharmacy, and children relish its sweetish root. Besides, the dried fronds of Ferns are recommended as a sedative for agitated nerves, and in certain countries they are used to make ear caps for the night for persons who suffer from insomnia. The people of the eastern Alps utilise the great Eagle Fern extensively as litter.

P. cretica. Of the Orient and the Mediterranean regions, and has been found in the Southern U. S. and in Guatemala. Totally different from the Bracken. It is a quite nice plant, with leathery, lanceolate-lineal evergreen fronds, hardly toothed at all. It wants a sheltered place in the rock garden or on the wall.

SCOLOPENDRIUM *vulgare,* or *S. officinarum.* Hart's-tongue, Hound's-tongue, Serpent's-tongue, Spleenwort, etc. This is the most curious of our Ferns, its fronds being not cut, but forming an oblong lanceolate strap; clear shining green; the fruiting organs are elegantly arranged underneath in narrow, parallel brownish lines. It forms a beautiful, persistent verdure, which in winter gracefully adorns the depths of the woods, the rocks, the shady places, and old walls. It is one of the most vigorous and withstands even the utmost drought. This species, which is distributed over the limestone mountains of Europe and North America, is of infinite variety. The English catalogues contain a multitude of forms, and we grow many of them at Floraire. The most interesting and most decorative are: *undulatum* (first rank), *capitatum, cristatum, crispum,* and *ramosum.* The celebrated fern grower, O'Kelly of Ballywaugham, Ireland (Ireland is the country of variable Scolopendriums), offers nearly 300 varieties! The Mediterranean regions offer, here and there, among the fissures of the maritime rocks, a delicate and charming Scolopendrium with almost triangular fronds (*S. Hemyonitis*). We succeed by protecting it in winter.

STRUTHIOPTERIS (*Onoclea*) *germanica.* Stoloniferous Fern. Eastern and Central Europe and the Caucasus. A stoloniferous plant with light yellowish-green fronds forming by the regularity of their disposition an elegant cup 80 to 100 cm. high with (starting from the centre) an erect column of dark brown fertile fronds. It loves the woods, the fresh corners, and the edge of the water, where it spreads rapidly. *S. pennsylvanica* (*Onoclea orientalis*) is its American form, much bigger, deeper green, and with the base of the fronds destitute of pinnules.

WOODSIA. A rare little Fern, finely cut, close to Cystopteris.

W. glabella. Of the boreal and arctic regions; frond glabrous, tender green, narrowly elongated (5 to 12 cm.), with pinnules widely spaced and very short. Peat and half shade.

W. hyperborea and *W. ilvensis.* Two tiny saxatile species belonging to the icy regions of the Northern Hemisphere, in the clefts of vertical rocks. Fronds short (5 to 20 cm. in *hyperborea;* 30 to 40 cm. in *ilvensis*), dull dark green. They grow on granitic rocks and, sometimes, very exposed to the sun. We cultivate these two Woodsias in a peaty, well-drained bed.

W. obtusa. Northern and southern Cordilleras; fronds 15 to 30 cm., of extreme lanceolate shape. Peat and half shade.

W. oregana. Rocky Mountains; diminutive plant with dark green glabrous fronds, very narrow toward the tip. Same culture as above.

WOODWARDIA *radicans.* A remnant of the majestic Fern forests of the carboniferous period. When I visited the marvellous Redwood forest in California with my friend, Carl Purdy, we saw this Fern as a splendid underwood almost hiding our motor by its enormous masses of fronds 1 to 2 metres high; they are bright green, elegant and immense! No words can convey an idea of that beauty. Alas, it is not hardy with me. Peat and acid soil.

CHAPTER X

THE TERRESTRIAL ORCHIDS

MODEST and unpretentious, the Orchids haunt our meadows, woods, and vales. They appear in the spring months and announce the summer. They bear their flowers in elegant spikes, except those that present themselves in the delicate form of the Venus's Slipper, whose stalks bear one or two flowers. One finds them here and there in meadows, in woods, on slopes, for they do not grow everywhere. Poor soils and lime are especially favourable for them; as soon as the farmer takes it into his head to manure the ground the Orchids disappear.[1]

The family to which these plants belong is one of the most distinguished of the vegetable world. It is also one of the most numerous; at present more than ten thousand Orchid species are recognised. The structure of the plant is peculiar—stem none or annual in the terrestrial species, leaves flat, flowers of variable form but always made up of six segments: three external, which correspond to the sepals of dicotyledons; and three internal, corresponding to the petals; the whole is called not a corolla but a perianth.

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[1] Books consulted for this chapter: A. D. Webster, *British Orchids,* Bangor, 1886; H. Correvon, *Les Orchidées Rustiques,* Geneva, 1893, and *Album des Orchidées,* Geneva, 1899 and 1923; O. Ames, *Enumeration of the Orchids of U. S. A. and Canada,* Boston, 1924.

The vegetative habits of these plants are very curious. They are divided into three groups: First, the saprophytes, which lack chlorophyll and leaves, and are nourished by the organic materials contained in the humus. Their root system is either a curious rhizome or subterranean branch, which does not put out true roots but the whole surface of which is designed to absorb water and nutritive material, after the manner of rootlets (Epipogon, Corallorhiza); or an agglomeration of numerous roots interlaced in a compact stock (Neottia, Limodorum).

In the second place there are the epiphytes, which grow on the branches of trees in warm countries or in the fissures of rocks. Their roots do not have the same uses as those of other plants: their functions are to attach the plant to the wood or the rock, to fix it in the interstices of the trees or the stones, and to take in air or moisture.

In the third place are the terrestrial Orchids, the roots and leafy organs of which absorb from the soil or the surrounding air the water and the mineral elements which the plant needs for its development. Their root system consists either of a rhizome (Goodyera), or of simple branching roots (Listera), or finally of tubers which form reservoirs in which are stored the nutritive materials, all life being concentrated during the period of rest in this one organ, a bud destined to conserve the plant for the following year. The tuber of the Orchid is palmate or entire, and presents the curious phenomenon of being generally in a double stage. There is the old tuber, which withers and blackens in proportion as it gives its life to the stalk and spike and finally disappears, and there is the new tuber or bulb, which carries the germ of life and of the plant for the next year. Among the palmate species the tuber takes the form of a man's hand, with four or five digits, which has given rise to many superstitious legends. This tuber is very persistent, and a case is cited (*Lyon Horticole,* Nov. 30, 1896) where such tubers, forgotten in a box for three months and a half, remained alive and bloomed the following year.

As soon as the period of vegetation returns, this tuber pushes up a germ which stretches out toward the light in a long whitish bud. This immediately puts forth, above the tuber, a crown of very fragile and delicate roots, which should not be cut or bruised. Then the stalk rises, nourished by the tuber and the roots; the leaves and the flower spike are developed, and the plant enters upon its period of glorious activity. One could write chapter and chapter upon the life of the Orchids, on the marvellous law which governs their cross-fertilisation by means of insects; but there is no room to do so here and I must refer my readers to the volume which I have published on this subject, which is unfortunately now out of print, but which, having been widely distributed, can no doubt be found in many libraries.[2]

The acclimatisation and culture of outdoor Orchids is a recent activity in the world of horticulture; it has no history, except that of the glorious Cypripediums, which were long ago introduced into the gardens. I saw in my childhood the beautiful flowering tufts of *Cypripedium spectabile* at the home of a friend at Fleurier, in the Neuchâtel mountains; and later I admired the English woods and parks adorned with *C. calceolus, macranthum,* and *spectabile.* Everybody knows some collections of the Cypripedium and of many other Orchids displaying themselves in wood, or bog garden, or even in the alpine garden.

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[2] A new edition of my *Album des Orchidées d'Europe,* with 67 coloured plates, has been recently published and is to be purchased at Floraire.

The Northern Hemisphere offers us many Cypripediums with which to adorn our rocks and gardens. The Himalayas, China, Japan, Siberia, the Ural, Central and Southern Europe, and North America have furnished their quota of species. At Floraire, where we have prepared in the lath house and elsewhere special beds[3] for these elegant forms, we grow with success most of the species that have been introduced.

Europe offers us *Cypripedium calceolus* (Lady Slipper), *C. guttatum, macranthum,* and *ventricosum.* The first (Plate X of the *Album des Orchidées*[4]) has a perianth dark brown, with yellow slipper; it is found in certain mountainous regions of Central and Southern Europe, but it is becoming very rare in Switzerland. This species has been cultivated in England, according to Paxton, since time immemorial. A form called *C. Helveticum,* which we do not know in Switzerland, was introduced in 1828.

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[3] The lath house, which we call "umbrosum," is a summer structure with flat roof and sides made of narrow strips, spaced their own width apart.

[4] We refer to the numbers of the plates which can be found in the *Album des Orchidées d'Europe,* for those who possess it.

C. guttatum has single or twin flowers, with its perianth greenish rose purple and its slipper white, spotted with rose; 20-30 cm. high; it grows in the sphagnum bogs of the Ural, in the Siberian mountains, and in Canada. Its culture is the most difficult of all, and I must confess here that I have never seen it flower with me; but I have seen it in Germany, England, and Holland, though always slender and of puny aspect. The *Gardener's Magazine* of Feb. 11, 1888, describes its culture, and the author asserts that it will thrive as well as ordinary Cypripedium. It demands a very porous, well-drained soil, composed of equal parts of sphagnum, loam, and peat soil, and should be handled in a cold frame, though it may be hardy.

C. macranthum is above all Siberian, but is nevertheless found in European Russia, in the environs of Khasan and in the Ukraine. It is the most brilliantly coloured of all the hardy Cypripediums. Its flower is larger (stalk 20-30 cm.), with outer segments of a beautiful carmine rose, and slipper of a bright carmine, veined with black at the tip; it flowers in April and May.

C. ventricosum closely resembles the foregoing, but the flower is larger, with outer segments narrow and of a more intense and more brilliant colouring.

It is found in Siberia and comes by way of the Ural, as far as the centre of Russia.

The three last-named species are native to Siberia, whence they have spread to Russia. Some years ago the justly famous establishment of Messrs. Regel & Kesselring, at Petrograd, destroyed by the Bolshevists, presented to the garden at Floraire the true *C. ventricosum* and the new *C. mandschuricum,* both of Manchurian origin.

Japan has given us the very curious *C. japonicum,* which I have seen blooming at Kew and at Friar Park in England, but which I have never succeeded in growing. The flower, with green perianth dotted with purple, is not striking, but its foliage is extraordinary, for it is like its compatriot, *Ginkgo biloba.* The leaves are stemless, placed opposite each other halfway up the stalk, which is 20-30 cm. in height, and their clear green blade is broad, spread out in a fan, deeply pleated and sharply cut as with scissors, which gives it a curious appearance. Originating in the wooded regions of the environs of Yaddo, this plant demands a very porous soil, half shade, and moisture; it flowers in May and June.

From Yunnan, Tibet, China, since 1910, numerous new Cypripediums have been brought into cultivation, some of them being great marvels. They are *C. debile* from Japan, with a little purple-greenish flower; *C. Franchetti* from Tibet, with a large flower red, white, and pink; *C. himalaicum* with rose-purple and greenish flowers; *C. luteum,* one of the best, with large light yellow flower, from Tibet and China at 3000 m. altitude (Farrer says it is a yellow-flowered *spectabile*); *C. speciosum* from Japan, near to *macranthum* and *ventricosum*, veined white and deep rose; *C. tibeticum*, a small Tibetan Lady-Slipper with large white flowers striate with brown on a 10 cm. stem. All these Asiatic beauties are of difficult culture and must be given culture No. 7 (see p. 44).

North America has given us a rich collection of outdoor Cypripediums. From Canada and the Northern United States we have the beautiful *C. spectabile* (*hirsutum* or *Reginæ*)—Moccasin Flower—with rosy white segments and bright rose slipper, one or two flowers on stalks 40-50 cm. in height. It has been cultivated for more than a century, and is widely distributed, on account of its easy culture.

From the same regions we have *C. pubescens* (the American Calceolus) distinct from ours by its greater hairiness and slightly smaller flowers, arranged in two and three on stalks of 30-40 cm.

The same country gives us *C. acaule*, with solitary flowers on a short stem (5-10 cm.), with perianth bronze-green veined with brown, pointed with carmine at its tips and a large rosy white slipper veined with carmine; *C. arietinum* with stalks 25-30 cm., bearing one to three flowers resembling those of Calceolus but smaller, with white slipper veined with purple (a rare and delicate plant which we grow fairly well in the lath house); and *C. Californicum*, with high stems 30-60 cm., much leaved, bearing a spike of three to six small Calceolus-like flowers, but more delicate and smaller in all their parts, with the outer divisions of the perianth of a clear brown and the slipper rosy white. This species grows in the lath house; it requires a dry situation and good drainage.

C. candidum has a single-flowered stalk 25-30 cm. in height, outer segments short, green striped with chocolate brown, globe-shaped slipper of a beautiful white outside, rose within.

C. fasciculatum has a slender stalk bearing two leaves and two to five small flowers of a greenish yellow striped with brown, forming a bouquet at the top of the stem. It needs the *tourbière*[5] and half shade.

C. montanum has a single-flowered hairy stalk and outer segments dark brown and waved, lip clear rose.

C. occidentale has a stalk 25-30 cm. in height bearing oval lanceolate leaves and two or three flowers with dark red-brown wavy segments and a small slipper of rosy white.

C. parviflorum, with stalk of 30-40 cm., is provided with pointed oval, strongly nerved leaves, and bears two to three flowers similar to our Calceolus but smaller.

C. passerinum closely resembles Calceolus, but has more brilliant flowers, with outer segments of a greenish or yellowish white and a spherical slipper of a clear rose spotted with purple within; it is a rare plant of the Rocky Mountains.

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[5] See Chapter V for description of *tourbière.*

As for culture, all the Cypripediums except the species for which I have indicated special culture, thrive in a turfy and spongy soil, in half shade. One should disturb them as seldom as possible, and let them establish themselves as they like under shrubs or among Rhododendrons. It is well, when one buys imported rhizomes, to see that the roots are not dead and black, and that the bud is plump.

The ravishing *Calypso borealis* (*C. bulbosa*)—Hider of the North (Pl. III, *Album des Orchidées*)—is a Cypripedium in miniature. There are few flowers which have so much aroused the affection of amateurs of hardy Orchids. Its single flower, at the top of a stalk 5-8 cm. in height, its delicate clear rose perianth, the charming bright rose slipper mixed with velvety yellow in the interior, its single pleated dark green leaf, its whitish bulb or pseudo-bulb, which in the natural state buries itself halfway in the moss or the turf and hardly allows its point to come out—everything in this plant is graceful and delicate. One would think it tropical—a sister of the Lælia and Cattleya—but its habitat is in the marshes of extreme Northern Europe and boreal America. I saw it, however, in the woodlands of Oregon, flowering in the rich leaf mould and forming there large colonies of pink stars. Nevertheless, it must be grown under a light protection from cold; the late frosts easily destroy both leaf and bud if snow is missing which protects it in Nature. We succeed with it in the *tourbière,* but our climate is too dry for its long persistence here.

These (Cypripedium and Calypso) are the most brilliant, the most elegant, of the terrestrial Orchids. Among those with clustered roots are also many kinds grown for their elegance and the beauty of their flowers. Cephalantera, Epipactis, Goodyera, and Listera are equally beautiful, fine, or interesting.

The CEPHALANTERA, Helleborine, are plants with leafy stalks, their flowers forming, by their polygonal divisions somewhat similar to each other, a slightly opened helmet. They are exclusively plants of wooded slopes. *C. ensifolia* (Pl. IV) and *pallens* (Pl. V) have white flowers. *C. rubra* (Pl. VI), the most attractive of all and one of the most graceful of terrestrial Orchids, has flowers of a beautiful rose colour. All grow in the wooded regions of Europe, and are cultivated under lath shade or in woods.

The EPIPACTIS are closely related to them. Their flowers are smaller, with outer divisions fairly equal and well spread out. Like the Cephalantera, the Epipactis are dwellers in the mountain woods, always on slopes (so far as the sylvan species are concerned).

E. atrorubens (Pl. XI); flowers sombre red violet.
E. latifolia (Pl. XII); greenish flowers lightly tinted with rose.
E. macrophylla (Pl. XIII); flowers brown red; cultivated rather easily, especially if one has slopes to offer them.

The two swamp species:

E. gigantea, of the United States, and
E. palustris (Pl. XIV), of our marshes, with yellowish-white

flowers spotted with purple, are cultivated easily in the bog. The first does not stand our winters very well and requires protection.

The genus GOODYERA has a rootstock creeping underground or in the moss in the form of a thick rhizome.

The European *G. repens* (Pl. XVII) grows in the woods of the whole Northern Hemisphere, but its stations are somewhat scattered. It is a modest little Orchid of 10 to 15 cm. in height, with pure white flowers arranged spirally in a one-sided spike, which we grow successfully in the lath house; its dull dark-green foliage is very attractive.

North America has given us three similar species:

G. Menziesii, pubescens, and *tessellata,* whose leaves are more or less spotted with white; and Japan has: *G. Japonica,* which seems to be a form intermediate between *Menziesii* and *pubescens*. They all thrive in the shade and on turf, peat, and leaf mould.

The LISTERA have green flowers, but their opposite leaves, very large in *L. ovata,* Twayblade (Pl. XXVII), which can attain 40 cm. in height, are tiny in *L. cordata* (Pl. XXVI), which is a minute species of the alpine woods, having a very distinct character. The lath house is required for *cordata* and woods or bog for *ovata.*

The Orchids with tubers are among the most attractive forms of vegetation of our cold or temperate countries. It is more than sixty years ago that I began to bring them in from my rambles in the country and endeavoured to acclimatise them. Still a child, I attempted to root up the bulbs in full bloom, and naturally did not succeed in growing these beautiful, capricious plants. I had to endure many sorrows and disappointments before finding out that it is necessary to transplant the Orchids in a dormant state, after the blooming season, when the stalk has faded away and the new tuber is almost mature. We had thus introduced at Floraire, in ten years after we established this garden, almost all the Orchis and Ophrys of our country; and we are endeavouring to introduce the species of the East, of Northern Africa, and of Southern Europe. It gives us indescribable happiness to see reappearing with us in the autumn (for many of them are developing leaves in the late autumn) the beloved Orchis and the no less cherished Ophrys. In the meadow of which I have spoken, at Floraire, there are colonies of the Goat Orchid, the Burnt Orchid, the Monkey Orchid, the Military Orchid, the Male Orchid, the Helmet Orchid, and others. In a dry border we have the curious *Aceras longebracteata* of the Mediterranean Olive orchards, which blooms from the month of February; the Ophrys which an Oran friend has had the goodness to send us; and those which we have collected in the South or in our own country. All live and bloom so well that I find as much pleasure in admiring them there, in captivity with me, as Mr. Burrage finds in looking at his costly exotics.

There are many classes among the tuberous Orchids and many methods of culture. We have, first, the great family of Orchids of the swamps and moist meadows.

Orchis laxiflora (Pl. XLVI), is the most brilliant of all; it has large bright carmine flowers with a white spot on the blade, in a loose spike on a 40 cm. straight stem.

O. palustris (Pl. LIII), resembles it but has a smaller flower. The leaves of *O. incarnata* (Pl. XLIV) and *latifolia* (Pl. XLV) are spotted with brown. All four have flowers of a more or less intense carmine; all have been found elsewhere with white or rose-coloured flowers, but I have rarely had the pleasure of seeing these varieties thrive with me.

Then there are *Gymnadenia conopea* (Pl. XIX) and *odoratissima* (Pl. XXI), both very fragrant, which seek damp places, watery slopes rather than flat ground, but which thrive admirably in my bog.

Except *Orchis laxiflora* and *palustris,* all the marsh Orchids have palmate tubers.

The *Liparis Lœselii,* Fenn-Orchis (Pl. XXV), with pseudobulbs, like the superb epiphytes of the tropics, with green flowers somewhat insignificant, are also plants of the bogs and marsh.

Herminium monorchis, Musk Orchis (Pl. XXII), a delicate and slender cluster of yellowish-white flowers, with a strong formic acid odour, haunts humid slopes in certain alpine countries.

We grow in the *tourbière* the Malaxis (Pl. XXVIII and XXIX), tiny Orchids with greenish flowers, belonging to the bogs of the cold countries of our hemisphere.

The varied *Microstylis* of North America are near relatives of Liparis, with pseudo-bulbs and greenish-white spikes.

Then there are all the *Spiranthes,* Ladies' Tresses (Pl. LXIV and LXV), European or American, with small white flowers, arranged in spiral spikes.

Three American species of certain beauty are *Aplectrum vemale,* Putty-root or Adam-and-Eve, with a very thick and globulose root emitting one large leaf and a stem 25-30 cm. high bearing a bunch of brown and greenish flowers maculated white and purple; *Arethusa bulbosa,* Dragon's-Mouth, with a large underground tuber putting forth in spring a solitary nerved leaf and a long simple branch which bears one or two large fragrant flowers of a beautiful rose lilac; and *Calopogon pulchellus,* Grass Pink, a pretty little species with a firm, small bulb and a stout stalk (20 cm.) bearing in June a loose spike of flowers of a beautiful carmine, with a lip covered with white, yellow, and lilac hairs.

All these species (one could add, among the swamp species, the superb *Orchis foliosa,* of Madeira, which requires protection at Geneva), together with the two Epipactis of which I have spoken above, accommodate themselves to the bog (for the most delicate, let us say the *tourbière*) without requiring other care than to be guarded against encroachment by plants that are of too vigorous growth.

Among the Orchids of the woods and coppices are many very pretty species.

In the first place are the *Platanthera,* sought for because of the perfume which their flowers exhale, and the charm of their appearance. *Platanthera* or *Orchis* or *Habenaria bifolia,* Butterfly Orchis (Pl. LX), is widely distributed in the forests of Central and Southern Europe, Siberia, and the Mediterranean regions; its tubers are entire, of a long oval shape and pointed at the base and it has two large opposite leaves at the foot of the stalk (40-50 cm.), which carries in May and June a spike of very sweet white flowers. Its sister, *P. chlorantha* (Pl. LXI), of the woods of Europe and the Orient, has green flowers that are slightly fragrant. Both are excellent for shady places, and bloom even under fir trees.

Next comes *Orchis maculata,* Spotted Orchis (Pl. XLVIII), of Europe, Siberia, and the Orient, with leaves spotted with brown, stalks 40-60 cm. in height, spike short and crowded, with flowers (borne in June or July) of a lilac rose or clear lilac or even a very pure white. The tuber is palmate, as among the bog species, which proves that it prefers moisture to dry ground.

The king of Orchids, *Orchis fusca,* the Helmet Orchid (Pl. XLII), of stiff form and dominating aspect, with a conical spike of black, rose, and white flowers supported by a stalk which can attain 70 cm., buries its great tuber at 15-20 cm. and protects it in the jumble of tree roots.

O. fusca is not properly a sylvan plant, for it loves the light. But it likes the society of low trees and shrubs, and remains by preference in the shelter of coppices and hedges. We have a superb specimen with pure white flowers and another which is a hybrid between this and *O. militaris.* Plant it on the edge of the coppice or in places near trees; it needs deep soil.

But it is the meadow, the grass plot, which suits the greater number of the Orchids, and here one can introduce most of the Ophrys, those delightful spurless flowers (that is the essential difference between them and the Orchis, whose flowers are provided with spurs containing the nectar) which imitate so well certain insects. In the hot places in the meadow one will plant:

Orchis cordata of Portugal, with greenish-white flowers.

O. coriophora of Central and Southern Europe, a rare and curious species with the odour of a bedbug, and flowers of a livid red and purple.

O. longicornu of Southern Europe, nearly related to *morio.*

O. longicruris of Southern Europe, with flowers of purple lilac and bright rose.

In the fresh corners:

O. mascula, the Male Orchid (Pl. LXIX), of the shady places and mountain pastures of all Europe and the Mediterranean region of Asia. Beautiful species of 40-50 cm. with a long spike of bright purple flowers, appearing in May and June, of which we have one plant with pure white flowers.

O. militaris, the Military Orchid (Pl. L), handsome species of the moist meadows of Europe, Siberia, and the Orient, with stalks of 40-50 cm., a spike of flowers with whitish perianth and lip of a beautiful dark rose purple (May-June).

O. morio, Monkey Orchid (Pl. LI), very common in the heavy clay soils of all Europe and Siberia, with cylindrical few-flowered spike, flowers of a more or less sombre purple, rose, lilac, or pure white (April-May); the easiest to cultivate.

O. papilionacea (Pl. LIV); superb species of the Mediterranean coast, which has large flowers of a rose scarlet, with outer segments purplish.

O. sambucina, Elderbush Orchid (Pl. LV), of the European mountain zone, with flowers canary yellow or velvety purple or even the colour of the dregs of wine, with a bilobed angular tuber.

O. spectabilis, the only American Orchis, with flowers of a dark rose violet and lip of a handsome white.

O. tridentata (Pl. LVIII); Central and Southern Europe; flowers of a purplish rose with rosy lilac lip.

The following Ophrys accommodate themselves equally to the damp meadow, although all the species of this genus prefer sunny slopes and heavy soils:

O. apifera, Bee Orchid (Pl. XXXIII), *O. arachnites,* Hornet Orchid (Pl. XXXIV), *O. muscifera,* Fly Orchid (Pl. XL). One will plant there also with success the Lizard Orchid, *Himantoglossum hircinum* (*Orchis hircina*) (Pl. XXIII), of large dimensions, with a greenish flower having a long lip rolled in a spiral and exhaling a strong odour of goats; and the *Gymnadenia* and *Listera ovata,* of which we have spoken above.

An important group of Orchis, and all the Ophrys, require full sun, a turfy slope, a dry grass plot, or even a well-drained sunny border. These are the following species: *Aceras anthropophora,* Hanging Man Orchid (Pl. I); *A. longebracteata* (Pl. XLVII), which it is necessary to protect lightly in winter; *Comparia taurica; Ophrys apifera* (*arachnites, aranifera*), Spider Orchid (Pl. XXXVI); *atrata; Bertolonii* (Pl. XXXVII); *bombylifera; ferrum-equinum; fusca; lutea* (Pl. XXXIX); *muscifera* or *miodes,* Fly Orchid; *scolopax,* Woodcock Orchid; *speculum,* Mirror Orchid; and *tenthredinifera,* Sawfly Orchid. There are no flowers more popular than those of Ophrys, on account of the resemblance of many of them to animals and more especially to certain insects. The causes of this mimicry are not yet well understood, for the fertilising insects do not eat flies, bees, or hornets.

To those beautiful plants should be added the superb Serapias of the South and Mediterranean regions, especially the two most beautiful: *S. longipetala* (Pl. LXIII) and *S. cordigera* (Pl. LXII), which in our climate it is necessary to plant in dry, sheltered places. The *Orchis* or *Anacamptis pyramidalis* (Pl. II), is one of the most brilliant among our native Orchids; its short, crowded spike in the form of a pyramidal cone is carried on a stalk of 30-40 cm. and rises, full of life and freshness, from the bosom of the dry meadows and sunny slopes of Southern Europe in the months of May and June. It loves a slope, and we grow it in the sunniest sloping part of our meadow.

Besides these plants of the woods, meadows, and fields, there are many mountain Orchids, which can be acclimatised easily if one takes care to observe their conditions of existence.

In the first place is the *Nigritella,* the sweet, curious, delicious Vanilla Orchid, with small spike of dark garnet, brown black, exhaling a sweet perfume of vanilla, and which is sometimes used for flavouring. This is the one species among Orchids that contains the most of vanillin; but that essence, or one closely resembling that of the tonka bean, is very common in many of our native Orchids.[6]

The Orchid called *Nigritella angustifolia* (*Orchis nigra*), Vanilla Orchid (Pl. XXXI), haunts the mountain pastures of Europe and part of Siberia. It has produced with *Gymnadenia odoratissima* a charming hybrid, *N. suaveolens* (Pl.

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[6] On this subject read the appendix to my volume, *Les Orchidées Rustiques,* p. 231.

XXXII), with even more delicate perfume, longer spike, and a dark carmine flower, which is found occasionally in the Alps. In the Maritime Alps above Mentone is a Nigritella with delicate light rose or pure rose colours; it is *N. rosea.*

Nigritella blooms well at Floraire, but not until recently, for it has been really acclimatised for only a few years. It is in the *tourbière* that this species has finally flourished and has bloomed quite as well as in the mountains, for it requires a peat soil, watered from below. I cannot recommend the procedure for all countries, but in our Continental climate there is no doubt that this is the necessary treatment.

Also in the *tourbière* I have grown the Frog Orchid, *Orchis viridis* (*Peristylus viridis,* or *Cœloglossum viride*) (Pl. VIII). This little Orchis which springs from the smooth turf of the alpine pasture to peep out at the passer-by, who often does not see it because it dresses itself in green and drab, is difficult to acclimatise. So also is its neighbour *Gymnadenia* or *Orchis albida* (Pl. XVIII), which takes refuge where goats abound, under and among the tufts of Rhododendrons and Huckleberries. This *Gymnadenia* is very tiny in its flower, very delicate, absolutely charming; its little whitish corolla exhales a sweet odour of honey and lifts itself on a slender and crowded spike.

Orchis globosa (Pl. XLIII), so called because of its great globular tuber, has flowers of pale lilac verging on rose, crowded on a short spike at the top of a stalk of 40-50 cm. It also is a child of the alpine and mountain pastures of Europe, and we grow it under lath shade or in the *tourbière.*

The little *Chamæorchis alpina* (Pl. VII), 5-8 cm. high, with flowers on a short greenish spike, is a miniature Orchid which it is rare to find even in its natural stations. This is also a plant for the *tourbière* and for peat or leaf mould.

The superb *Platanthera* or *Habenaria* of our woods and those of North America, which I have already described can also find there their place, as well as the rare *Tipularia discolor* of North America, with small greenish-rose flowers resembling the insect Tipula.

Japan has given us superb large Orchids under the name *Bletilla* (*Blettia*) *hyacinthina* and *veracunda.* This is a genus with thick bulbs, blooming in the sun, with large nerved leaves and large flowers also, clustered in fours or fives on a beautiful terminal group of a more or less bright rose amaranth, or purple white in the variety *alba* of *hyacinthina.* Very robust, absolutely hardy, we have had them in the lath house, where they have bloomed rather grudgingly. In the botanic garden of Geneva they are treated (at least *hyacinthina* is) like a common hardy plant, being placed in the rockery of Japanese plants, in half sun, where they thrive wonderfully.

Many amateurs have attempted to multiply Orchids by means of seeds. Count du Buysson introduced at his home many species by scattering in autumn in the places favourable for them the seeds of Orchis or Ophrys. We have obtained rather poor results at Floraire.

In Germany some gardeners have succeeded in raising hardy Orchids from seed in a bed or greenhouse. The *Gaertner Zeitung* of Erfurt, January 10, 1897, gives an interesting account of this. Elsewhere I have discussed this system adopted in Germany. It would be too long to repeat here.[7]

Those who read Norwegian should consult an interesting work on the culture of glacial and arctic plants by N. Moë, head gardener of the Botanic Garden at Christiania (Oslo), who gives interesting views on the question (*Veiledning til Dyrkning af glaciale og arctiscke Planter*).

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[7] *Les Orchidées Rustiques,* p. 210.

Finally, I have tried to explain in detail in this book the method of sowing delicate seeds (see Chapter V).

CHAPTER XI

HARDY CACTI

For many centuries a little Cactus with yellow flowers has haunted the arid rocks in Valais, Switzerland. This is the modest *Opuntia vulgaris,* lightly attached, and flattened against the rocks, and on dry, hot slopes. It also grows in the environs of Meran (Southern Tyrol), above Domodossola, at the outlet of the gorges of Simplon (Ponte Crevola), and about Como and Ivrea, in Northern Italy.

How has this plant, belonging to a strictly American genus, become stranded on our rocks, and who or what could have brought it here? Mystery!

One summer day in 1885, when entertaining the traveller Bonvalot, I took him to Valère and there, showing him the Opuntia-decked slopes, I asked him if he thought that migratory birds possibly could have carried the seeds across the ocean. "Without any doubt, a bird," he said; "but lost, not migratory. On the desolate heights of Tibet, at many different times, I have seen lost birds, brought there by violent winds with a dizzying rapidity." M. de Candolle, who was present, cited some facts which supported the theory of my traveller friend, and we came to the conclusion that, at some time more or less remote, some stray birds had, unwittingly, carried seeds of the Cactus, either in their gizzards—for the fruit is sought by many birds, which do not digest the seeds but put them in the best possible condition for germination—or among their feathers or on their claws, which is also possible, thanks to the hooked spikes with which the fruit is provided.

However that may be, or even if it were assumed that there were Cactus amateurs who, two hundred or three hundred years ago, had acclimatised the plant in the valleys at the foot of the Alps, the fact is that we have there a species that is European by acclimatisation. The plant is hardy, and resists the most severe cold, even in Berlin.

Apropos of *Opuntia vulgaris,* here is a note which we find in the *Bulletin of the Association pour la Protection des Plantes* (Geneva, 1901):

> The introduction of Opuntia into Australia and more particularly into Queensland has had effects quite as fatal to agriculture as that of rabbits. The American plant has invaded everything, and the Colonial government has issued an edict for the destruction of the pest. It offers one thousand pounds reward to anyone who will find the means of ridding the country of this plant. The German Consulate at Sydney has hastened to make this notice public in all the journals of the country beyond the Rhine, in the hope that some German subject will be found who will discover the remedy and capture the prize offered.

This species has been cultivated for a long time on our rocks, but it is only within about forty years that, thanks to the voyage of the German botanist, Purpus, other species which stand our winters equally well have been introduced. There had been occasional plantings of *Opuntia camanchica, Missouriensis,* and *Raffinesquii* in rock gardens, but those were no more than timid experiments. Dr. Purpus and a select group of American botanist travellers have introduced quite a collection of new hardy Cacti. Professor Rose of the Smithsonian Institution, himself the discoverer of so many interesting species of Crassulaceæ, devoted himself to the study of Cacti that could withstand the winters of our Central Europe. Dr. Purpus sent first to the botanic garden at Darmstadt, then to many horticulturists, a collection of species obtained at altitudes of 1600 to 2000 metres in the mountains of New Mexico, Arkansas, Texas, Colorado, and Arizona, and in view of the richness of these new introductions, there was a chorus of praise and admiration. Besides several species and varieties of Opuntia, he discovered some of Mammilaria, Cereus, Echinocactus, and even Agave, mountain-growing and hardy. Then there was, in favour of the hardy Cacti, a burst of enthusiasm which spread over the whole of Europe. They were bought at very high prices; then people wearied of these spiny objects, as they have wearied of so many other beautiful and interesting things. Twenty or thirty years ago there was a veritable frenzy for the hardy Cacti in Germany, but that has greatly subsided.[1]

In the botanic garden at Darmstadt a very curious rockery is devoted to hardy Cacti, which Dr. Purpus barely covers in winter with boards, to prevent the masses of snow from breaking the branches of the delicate species. This rockery is very picturesque and of the greatest interest. I saw it in 1904, and on reaching home I had no rest till I had planted, on top of the wall at Floraire, the collection of Cacti which until that time we had kept in pots and jars. These Cacti profited admirably by the change and soon formed a superb and original decoration. Above them all rises *Opuntia arborescens,* a large species of loose form, with sprawling branches, more than one metre tall, and calling to mind the great candelabra-like Cacti of Mexico; then come the enormous spiny tufts of the stout *Opuntia macrorhiza, gigantea,* etc.; and those with delicate flowers of rose or carmine or amaranth, with their centres of golden stamens—*Opuntia fulgens* and *rubra* or *Xanthostemma elegans.*

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[1] Now it begins again.

In April, 1926, I travelled through the Mohave Desert, on the way from Los Angeles to Santa Fe, and saw some highly coloured glowing magenta-flowering Opuntia which I ventured to identify with the *O. magenta,* Parish, of the "Californian Flora" by Jepson. It was such a brilliant vision that every traveller in the car admired it. But, up to this day, nobody has been able to supply me with seeds of that marvel.

In the deserts of New Mexico we traversed large spaces—hills, slopes, and stone masses—covered with a shrubby Opuntia looking exactly like *O. arborescens,* which I could not identify with the Jepson "Flora."

There was a marvellous Echinocereus, *E. phœniceus,* with flowers of cardinal red passing into purple, vermillion, or the most intense scarlet, with centres of golden stamens.

The top of our wall formed a harmonious ensemble in the summertime with all these spiny exotics. But we have removed them to a barren sand bed, for the top of the wall was completely invested by them and we could have nothing else!

It suffices, in order to succeed out-of-doors with these Cacti of North America, to have a well-drained soil, rather heavy than too light, deep enough to permit their long roots to penetrate it, and a situation in full sun and well lighted. If these conditions are fulfilled, it matters little whether they are grown on a rockery or in the border. And one will have brilliant blooms during the summer months, when most of the rock plants have finished their rôle. The most violent winds seem to benefit them, and evidently they prefer limy soil to one that is granitic and siliceous—therefore neither leaf mould nor peat soil. In winter, in humid countries and where snow is abundant, it is well to erect at one metre above the ground a protective roof to shelter them from too much humidity or heavy falls of snow.

Their multiplication is easy by means of seed (the seeds borne in abundance germinate like weeds), or by sectioning their joints (among the Opuntias), or finally, by division of the tufts.

Here is the list of species hardy in the climate of Central Europe and the United States of America:

CEREUS *viridiflorus,* from the mountains of Texas, etc.; small species with flowers of greenish yellow and stalks in the form of little columns.

ECHINOCACTUS *glaucus,* from the high mountains of Colorado; with flowers of a very beautiful rose.

E. Simpsoni, from the Utah and Colorado mountains (altitude 2500 m.); likewise very hardy.

Echinocereus Fendleri, from Colorado; an intense carmine red passing into violet; flowering in July and August.

E. phœniceus, from same country, with brilliant flower of glowing red.

MAMMILARIA *Missouriensis,* from the Rocky Mountains (2000-2200 m.); small flower of 10 to 25 cm., with yellow flowers and scarlet fruit.

M. Purpusi, from Colorado (2000-2500 m.); small bowl-shaped plant, very spiny, with flowers of a lively rose; very hardy.

M. radiosa, with greenish flowers having a rose centre; July, August.

M. Spæthiana, from Colorado (more than 2000 m.); differs from *Purpusi* by its flattened orbicular form.

M. vivipara; small yellow-flowered species that attains 50° north latitude and is the hardiest of all.

OPUNTIA *albispina,* a form of *camanchica* with very white spines and flowers brownish yellow.

O. arborescens, from New Mexico; a shrubby plant, reaching 10 metres in its natural state, with straight branches, not jointed, spiny and sprawling; flowers of a lively rose.

O. arenaria, from Texas; a low plant, very spiny, with pale yellow flowers.

O. Arkansana, from Arkansas; strong plant, very spiny, near *Raffinesquii,* with clear yellow flowers, brownish in the centre.

O. *brachyarthra,* from the Rocky Mountains; low plant with clear yellow flowers.

O. *camanchica,* from the Rocky Mountains; one of the old types; strong plant with thick, very spiny joints and large flowers of straw yellow. There are a great many varieties of it, and it has the forms *major* and *minor.*

O. *cantabridgensis,* very thick, strong plant which sprang up in the Botanic Garden at Cambridge and whose history is unknown; there it is hardy and spreads at the foot of a greenhouse wall in full sun. We have received and planted this; flowers yellow; it grows well and fruits with us.

O. *cymochila,* from the Rocky Mountains, a variety of *Raffinesquii.*

O. *Engelmanni,* from the Rocky Mountains, with flowers of greenish yellow, sulphur-coloured in the interior.

O. *fragilis,* from Colorado, low species, with globular joints (rounded at the two ends); yellow flowers with clear carmine stamens.

O. *fragilis* var. *cæspitosa,* low and tufted form of the preceding, with smaller joints.

O. *fulgida* (*fulgens*), from Mexico and New Mexico, superb species with oblong joints; reddish green, large flowers of a beautiful red with yellow stamens.

O. *macrorhiza,* variety of *Raffinesquii,* with thick stem and heavy joints.

O. *magenta,* growing along the railway line in the Mohave Desert.

O. *mesacantha,* lower variety of *Raffinesquii.*

O. *Missouriensis,* from Colorado, obovate joints, thick and of a bluish green; seeds with brown pickles, yellow flowers with stamens of the same colour. This species is the northernmost of the genus, its area extending to 51° north latitude.

O. *ophiocarpa,* from Kansas, a plant near *camanchica.*

O. *orbicularis,* small form of *camanchica* with swollen orbicular joints.

O. *pachyarthra,* from Colorado, prostrate plant with thick joints, sprawling over the soil, large flowers of clear yellow with yellow stamens.

O. pachyarthra rosea, variety of the preceding with flowers of a lively rose.

O. pachyclada, from Colorado, low species with small joints; many large flowers of a beautiful carmine rose with tints of dark orange.

O. pachyclada Spæthiana, from Colorado, yellow flowers verging toward brown.

O. phæacantha, from New Mexico, flowers greenish on the outside, sulphur yellow within.

O. polyacantha; a very spiny variety of *Missouriensis.*

O. Raffinesquii, from the Rocky Mountains, very strong plant with large obovate joints of a dark green, armed with prickles only on the upper edge; large yellow flowers with brown streaks or spots in the centre.

O. rhodantha; passes for a variety of *Missouriensis* with red flowers; superb plant, with large flowers of an intense carmine with carmined stamens and green style in the centre. There are the varieties *brevispina, flavispina, pisciformis,* and *schumaniana,* all with flowers more or less rosy.

O. rubra, from Colorado; a solidly built plant, with flowers of a sombre cinnabar red, carmined at the borders.

O. spinocentra, from New Mexico, with yellow flowers.

O. vulgaris, this is our European plant, with low creeping branches, spread out at the edges, provided with few short prickles; yellow flowers of medium size.

O. xanthostemma, from Colorado; near *rhodantha,* from which it is distinguished by the dark reddish brown, more elongated joints and darker stamens. It has many varieties: *elegans* with flowers having silky reflections, of a beautiful rose carmine; *gracilis,* clear carmine; *orbicularis,* with rounded joints and clear carmine flowers; *rosea,* of a beautiful carmined rose.

The Opuntias are also highly variable plants; they hybridise with the greatest ease, and there are many forms which one cannot identify. The species with carmine rose or salmon or brown alternate delightfully with those having yellow flowers, and it is a marvel to see them by hundreds, in the fine days of summer, enlivening our Cactus bed.

Although not belonging to the Cactus family, the *Agave utahensis, virginica,* and *Parryi,* which are nevertheless succulent, grow under the same conditions and in the same soils, and should be placed among the rocks with the hardy Cacti. They are more delicate and require a covering in winter, or rather a roof to protect them against rains and snows.

In the garden of Dr. Wherry at Washington, D. C., I admired some hardy Cacti which he had brought from the Western deserts and which I have not included in the above list. The number of Cacti which could stand our winters is, I believe, greater, but as I have never tried them I cannot speak of them.

It is desirable that the number of amateurs of these beautiful and curious plants should be increased, especially in our Continental climates, which are more favourable to them than those of maritime countries. The Cacti do not need any care: scarcely should one water them, for their roots plunge very deeply into the soil, and their inflated stems (the leaves are represented by the spines, and the long joints, which are often taken for leaves, are only the stems) are filled with water and are true reservoirs of humidity. They flower at a time when rockeries are generally destitute of their most brilliant attractions, and these plants thus constitute an excellent decoration intermediate between the blooms of spring and those of the late summer.

CHAPTER XII

PLANTS FOR THE ROCKERY, AND WALL OR ALPINE GARDENS

HERE follows a list, as complete as possible, of all those plants which can be grown in gardens as rock plants, or wall plants, for alpine landscapes, beds, etc. (excluding the hardy Ferns, the terrestrial Orchids, and the hardy Cacti which are enumerated in their respective chapters), and which can be grown in the temperate climates of Europe, Japan, Australia, New Zealand, and America.

Since the publication of my earlier volume, *Les Plantes des Montagnes et des Rochers,* very many plants have been introduced from Central Asia, China, and elsewhere which have necessitated many additions to the lists then published.

The nomenclature of the *Index Kewensis* is followed wherever possible. Following most names are notations of:

1. The average period of most brilliant flowering as for the climate of Geneva, which is nearly the same in France, Scotland, Central England, and Eastern United States. Months are designated by Roman numerals, I—XII.
2. The approximate height of the plant. This cannot be stated absolutely because it will vary with climate (damp or dry), the soil (rich or poor), etc. The metric system, which is acceptable in all countries, is followed.

3. The colour of the flower.
4. The native habitat (see key below).
5. Cultural requirements, designated by Arabic numerals (1 to 10) according to the ten classifications described in Chapter III.

The letters L (chalk) or P (peat) where given denote definite demands for chalk or peat as the case may be. Medicinal plants are marked M and aromatic plans, Ar. The asterisk (*) signifies that the plant is not quite hardy in the general regions already named and needs winter protection while it can be treated as hardy in the West of Europe, South of England, Ireland, in the United States from Virginia to Seattle (Wash.), and southward; in New Zealand and Japan. All the plants listed are perennials with a few biennials, which are marked.‡ Geographical regions are abbreviated as follows:

A.R.	Arctic Regions	It.Al.	Italian Alps
Ab.	Abruzzes	J.	Jura
Al.	Alpine Range	Jap.	Japan
Ap.	Apennines	Leb.	Lebanon
Aus.	Australia	M.Al.	Maritime Alps
Atl.	Atlas and North Africa	Med.	Mediterranean regions
B.R.	Boreal Regions	Mex.	Mexican mountains
Ba.	Balkans	N.Am.	North America
C.Al.	Central Alps	N.As.	North Asia
C.As.	Central Asia	N.Z.	New Zealand
Ca.	Caucasus	Or.	Asia Minor, Persia
Cal.	California	Ped.Al.	Alps of Piedmont (Italy)
Can.	Canada		
Ch.	China	Py.	Pyrenees
Co.	Corsica	R.M.	Rocky Mountains
Cp.	Carpathian	S.Af.	South Africa
E.Al.	Oriental Alps	S.Am.	South America
E.Eur.	Eastern Europe	S.Eur.	South Europe
Eur.	Europe	Sc.	Scandinavia
Gr.	Greece	Si.	Siberia
H.	Himalaya	Sp.	Spanish Sierras

Tr.	Transylvania	V.Al.	Valesian Alps
Tu.	Turkestan	W.Al.	Western Alps
U.S.A.	United States of America	W.Eur.	West Europe
		Y.	Yunnan (China)

Horticultural varieties which are introduced in trade year by year, only to disappear some time after, are not listed. There are, for example, giant forms of Aubrietia, Saxifrage, Phlox; garden forms which are assuredly horticultural acquisitions but of no importance botanically or from an æsthetic point of view.

ABRONIA. Creeping plants from Midwest America, running over the sandhills or on the ocean shore, called Sand-Verbena in California, and very suitable for rockeries in the South and West United States. The flowers, some very sweet smelling, are borne in heads like those of the Verbena. I saw some in the Mohave Desert adorning beautifully the rocks in very barren places.

The best for gardens are *A. acutangula* of Oregon with pink flowers, and its closely allied *A. umbellata* of California, the oldest one grown in the gardens, with delicate pink flowers; *A. maritima* with deep crimson flowers, also from California; *A. nana* from the Mohave Desert and one alpine from the Sierra Nevada. These last two are very dense and cæspitose, forming prostrate clusters covered with pink flowers. *A. latifolia* is a prostrate little shrub, 2-4 cm. high, with bright yellow flowers. They all like light sandy soil, and an open and sunny situation in the alpine garden, but cannot be considered hardy in Geneva or in Northern United States and Canada. As they are easy to raise from seed, they can be treated as annuals.

ACÆNA. Curious creeping plants (generally a few are erect), belonging to the Sanguisorba group of the Ronceæ, and coming generally from the Southern Hemisphere and Antarctic zones (New Zealand, Chili, etc.). Some are hardy in our climate. They are raised from seed and increased by cuttings or by layers. The Acæna flowers are greenish and some have red bracts which are like fine needles; but their foliage has great value for the garden. They must be grown in shady places (at least in Continental climates) and they form splendid carpets of beautiful foliage.

A. Buchanani with light blue foliage; very dwarf creeping.

A. glauca with bluish foliage.

A. glabra, inermis, and *microphylla* (*argentea*) with reddish foliage sometimes whitish shining.

A. macrostemon, ovalifolia, pinnatifida, and *sarmentosa* from the Andes of South America.

A. Novæ Zelandiæ from New Zealand and Antarctic countries.

Some others are not hardy here:

A. myriophyllum, with very thin cut leaves (S. Am.).

A. ovina (N. Z.).

A. Sanguisorbæ, Berry-Berry (Aus.); spreading freely and rapidly, covering a large space; hardy in the west of France, England, etc.

Two kinds are half shrubby:

A. sericea (S.Am.), with silvery whitish leaves; and

A. splendens, beautiful, silky silver grey and shining (S. Am.).

Acantholimon. Oriental Statices or Sea-Lavenders with more or less spiny, grass-like bluish leaves, forming dense and large cushions on sunny places of the rockery. They belong to the flora of Asia Minor extending across Persia, and are numerous on Mt. Ararat where Boissier found so many interesting plants. They can be raised from seed or propagated by grafting on Armeria, or from cuttings made in August in sand and in a cold frame. Boissier has described not less than 77 Acantholimons of which only fourteen have been introduced, almost all by himself.[1] Two other kinds have been introduced since by the Botanical Garden of Tiflis.

All the Acantholimons grown in gardens have more or less bright pink flowers; they differ in the dimensions and tints of the leaves and of the flowers, and all want a dry, hot, sunny situation in the rockery or in the wall, a deep poor soil, and must not be watered from above nor on the leaves, but only through the soil. M. Boissier, in his botanic garden at Valleyres, lost the largest known specimen of *A. venustum* because water was sprinkled upon the flowers after a hot day. They all flower from June to August and form dense spiny cushions; the leaves are generally bluish coloured. They seem generally to like lime. The following kinds have been introduced into culture:

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[1] Boissier, *Flora Orientalis,* Vols. IV and VI. E. Autran, *Hortus Boissieri.*

A. acerosum from the alpine regions of Western Anatolia.

A. androsaceum (*A. Echinus*) from Greece and Anatolia; nice dwarf cushion; a diminutive of *A. glumaceum.*

A. armenum from the low hills near Erzeroum; short leaves and small flowers.

A. Ballansæ, an alpine form of the preceding with narrow leaves.

A. Fomini, newly found in the Caucasus and sent in 1910 from Tiflis; is near to *lepturoides.*

A. glumaceum from Mt. Ararat; the oldest introduced in gardens; wide cushions of deep green leaves; flowers (June-September) rather small and deep carmine.

A. graminifolium, Or.; has narrow spiny leaves and pale pink flowers.

A. Hohenackeri, East Ca.; dwarf and compact with bluish leaves.

A. Karelini from Armenia; has loose foliage forming lax bluish masses.

A. lepturoides from the environs of Tiflis; is a fine species with bluish foliage and pale pink flowers.

A. Libanoticum from Leb., where it grows in the vicinity of the Cedars; forms large dense tufts of greenish foliage with purple flowers.

A. quinquælobum from N. E. Persia; very spiny glaucous foliage and white and pink flowers.

A. ulicinum; a dark form of *Libanoticum* with shorter foliage.

A. venustum from the high Taurus of Cilicia is certainly the brightest of all, with its large bluish and spiny foliage and the marvellous big pink flowers (July-September).

ACANTHUS. Tall decorative plants of the Mediterranean regions which gave us the Corinthian capital of architecture; the leaves are of great beauty and the flowers, of light rose mixed with greyish violet, emerging from a high column of spiny and stiff bracts, are exceedingly decorative. They like a deep rich soil and a sunny situation; very hardy with us; flowering best in very hot and sheltered places. They come easily from seeds, but are rather invading. We grow *A. mollis* (*latifolius*), *longifolius,* and *spinosus.*

ACHILLEA. Millefoil. One of the commonest of the Compositæ. The alpine species are good things for the rockery while the high herbaceous ones find their place in the border or in big rock gardens; they are generally strongly aromatic herbs, some of them being reputed as medical. (The sign // indicates silver-grey foliage.)

A. abrotanoides VI-IX; 20 cm.; white; E. Eur.; 1.
A. ageratifolia VI-VII; 10 cm.; white; Or.; 6; //.
A. Ageratum VI-XI; 50 cm.; bright yellow; S. Eur.; 1.
A. (*Anthemis*) *Aizoon* V-VI; 5 cm.; white; Or.; 6; //.
A. alpina is non-existent and was an error of Linnæus.
A. argentea VI-VII; 10 cm.; white; Or.; 1; //.
A. atrata V-VI; 8 cm.; white; Al. Cp.; 6.
A. Clavennæ V-VI; 10 cm.; white; E. Al. It.; 6; //.
A. Clusiana VI; 8 cm.; white; E. Al.; 6.
A. clypeolata VII; 25-30 cm.; yellow; Ba.; 1.
A. coronopifolia VII; 30-50 cm.; yellow; Or.; 1.
A. filipendulina VII-XI; 1 m.; bright yellow; Or.; 1.
A. Fraasii VI-VII; 15 cm.; white; Gr.; 1; //.
A. Gerberi VII-IX; 10-15 cm.; yellow; Ca.; 1; //.
A. Grisebachii VI; 20 cm.; white; hybrid; 1; //.
A. Herba-Rota VI; 8 cm.; white; Ped.; Or. Al.; 6, 10; Ar.
A. holosericea VII; 30 cm.; yellow; Gr.; 1; //.
A. Impatiens VII-VIII; 50 cm.; white; Si.; 1.
A. inpunctata near to *moschata.*
A. Jaborneggi VII; 15 cm.; white; E. Al; 6.
A. Kellereri VII; 20 cm.; white; hybrid; 1; //.
A. macedonica is a form of *serbica;* //.

A. macrophylla VI-VII; 80 cm.; white; 1, 2; Ar.
A. micrantha VI-IX; 40 cm.; yellow; Or.; 6.
A. millefolium roseum, the pink form of the common Millefoil.
A. moschata V-VII; 10 cm.; white; Al. Cp.; 6, 10; P.
A. nana VI; 5-6 cm.; white; Al., Py., Sp.; 8; //; Ar. M.
A. nobilis VII; 50 cm.; white; Eur.; 1.
A. Ptarmica (*Alpina*) VI-IX; 40 cm.; white; Eur.; 1, 3.
A. pyrenaica VII; 25-30 cm.; white; Py.; 1, 3.
A. rupestris V-VI; 5-8 cm.; white; Ab.; 6, 10; Ar.
A. Sarracenica is a South Italian big form of *moschata;* Ar.
A. serbica V-VI; 10 cm.; white; Ba; 1; //.
A. sericea V-IX; 30 cm.; yellow; Leb.; 1.
A. sibirica VII; 40 cm.; white; Si.; 1.
A. sulfurea VII; 40 cm.; yellow; Or.; 1.
A. Taygetæa VI-VII; 20 cm.; yellow; Gr.; 1.
A. tomentosa VI-IX; 10 cm.; bright yellow; S. Eur.; 1.
A. umbellata V-VI; 10 cm.; white; Gr.; 7; //.
A. Vandasi VI-VII; 20 cm.; yellow; Ba.; 1.

The catalogues offer a large number of hybrids, most of them being artificially made by nurserymen who thus have the opportunity of honouring some friends. We cannot describe all of them; the best known are: *Frohmülleri, Hausknechtii, Kraettiiana, Obristii, Wilzcecki.* Some Achilleas are rather troublesome in their invading nature, and must be avoided in the rockery. Such are *Millefolium, Ptarmica,* and *sericea;* the first is good for the Swiss alpine meadows, and the pink form can be admitted in the rock garden; *Ptarmica* rejoices in damp places and its double-flowered variety makes a good effect in the rockery, but must be watched as it spreads so easily; and, finally, the beautiful *A. sericea* of Lebanon with its gold yellow flowers and grey foliage, is good for dry slopes or barren places in the garden or in big rockeries. All the Achilleas can be divided or grown from seed and the alpine species increased by cuttings.

ACHLYS *triphylla,* Deer-Foot, is a nice little Berberid which grows in shady woods of North

America; light green plant with trifoliate foliage, sinuate-dentate; flowers green on a leafless scape (20-30 cm.). I saw it nicely adorning the ground in the Redwood forest in California. Peaty bed and shade.

ACIPHYLLA is a New Zealand group of Umbellifers having some resemblance to the Agaves or Yuccas. They are not hardy with us and insist on acid soil. In England I saw *A. Traversi, Lyalli,* and *Kirkii* in many rockeries of the South and West.

ACONITUM, Monkshood, is a well-known genus of plants, rather big and stiff, which are usually grown in the wild garden and were the pride of the herbaceous borders of our ancestors. They are generally deep or light blue, yellow, or purple brown. Excepting Anthora, they like half shade, deep light soil, and rather damp than dry. Easily grown from seed—slow germinating—or by division.

A. album VII-VIII; 60-80 cm.; the pure white form of *Napellus.*

A. anthora VI; 60 cm.; yellow; Eur. Ca. Si.; 1.

A. autumnale (*A. Tauricum*) IX; 60 cm.; deep blue; Al. Cp.; 1.

A. Cammarum VII; 80 cm.; blue (near to *Napellus*); 1.

A. Columbianum (*Californicum*) VIII; 80 cm.; pale blue; N. A.; 1.

A. Delavayi X; 1' m.; dark blue; Ch.; 1.

A. delphinifolium VII; 60 cm.; blue; N. Am.; 1.

A. ferox VIII; 60 cm.; yellow; H.; 1.

A. Fischeri VII; 50 cm.; blue; Si.; 1.

A. Hemsleyanum VIII; climbing; deep blue; Ch.; 1.

A. Japonicum IX; 80 cm.; blue; Jap.; 1.

A. Kusnetzowi IX; 1 m.; light yellow; Eur.; 1.

A. Lycoctonum (*Vulparia*); VII-X; 1 m.; light yellow; Eur.; 1.

A. Napellus VI-IX; 80 cm.; deep blue; Eur. Ca. Si; 1; M.

A. Napellus var. *carneum* with pinkish flowers; there are of *Napellus* a great many varieties.

A. orientale (*ochroleucum*) VIII; 70 cm.; yellow; Ca.; 1.

A. paniculatum VII; 80 cm.; blue; Al.; 1.

A. pyrenaicum VIII; 80 cm.; yellow; Py.; 1.

A. septentrionale IX; 70 cm.; reddish purple; B. R.; 1.

A. Stoerkeanum (*pyramidale*) VIII; 80 cm.; blue; M. Al.; 1.

A. tauricum VII-IX; 60 cm.; deep blue; Or.; 1.

A. uncinatum VII; 80 cm.; blue; N. Am.; 1.

A. variegatum VII-IX; 80 cm.; white and blue; S. Eur.; 1; many varieties with white, pink, and blue flowers.

A. villosum VII-IX; climbing to 2-3 metres high; light blue; Si.; 1.

A. Vilmorinianum VII-IX; climbing to 2-3 m.; blue; Ch.; 1.

A. volubile VIII; climbing to 1-2 m.; deep blue; Ch.; 1.

A. Wilsoni X-XI; 1-2 m.; deep blue; Ch.; 1.

ACORUS, Sweet-Flag. A small group of water-side or marsh plants with leaves aromatic and decorative. *A. calamus, A. gramineus,* and *A. gramineus var. variegatus* are the species cultivated. They want moisture.

ACTÆA, Baneberry. A small genus belonging to the mountainous woods of the Northern Hemisphere. They have foliage similar to Aruncus, Goat's-Beard; rather low in stature (30-60 cm.); small white flowers forming dense short spikes followed by black shining berries in *Actæa spicata;* pure white in *A. alba;* bright red in *A. rubra.* The two last are North American. They all want a humus-rich soil and shade. The seeds are slow germinating. They belong to the Ranunculaceæ.

ACTINELLA. American Composites growing all along the Rockies, on the sea banks, etc., in rocky places. We grow *A. acaulis, A. grandiflora,* and *A. scapora;* all have yellow flowers in the style of the Arnica, and bloom in summer. They like a sunny place in the rockery, and can be either divided or sown.

ADENOPHORA, Lady-Bells, are a noble genus of the Campanulaceæ, many of them being exquisite and graceful beauties; being of easy culture, they ought to find a place in every big rock garden or in the border. Easily raised from seed.

A. coronopifolia VI-IX; 30 cm.; deep purple; N. As.; 1.
A. denticulata VII; 1 m.; light purple; Si.; 1.
A. Lamarkii VI-VII; 50 cm.; blue lilac; Si.; 1.
A. liliifolia VII-VIII; 50 cm.; bluish purple; Eur.; 1.
A. marsupiifolia (*coronata*) VII-IX; 40 cm.; violet; Si.; 1.
A. megalantha VII; 50 cm.; light blue lilac; Ch.; 1.
A. polymorpha VIII; 50 cm.; purple blue; Ch.; 1.
A. Potanini VI-IX; 60 cm.; light lilac; Tu.; 1.
A. stylosa VII; 30 cm.; blue; Si.; 1.
A. verticillata VII-VIII; 1 m.; light blue; Jap.; 1.

ADENOSTYLES. Big plants of the Composite family, belonging to the shady and cool places of the European and Asiatic mountains; sometimes, as for *A. leucophylla,* they haunt the *pierriers* and moraines. Their big orbicular leaves recall those of their cousins, the Petasites; they are smooth in *A. alpina* (*A. glabra*), villose in *albifrons* and *orientalis,* and downy white in *leucophyllus*. They like moist, cool soil and need to be planted in wide stretches in order to enjoy their decorative value. *A. albifrons, leucophyllus,* and *orientalis* are acid-soil plants, while *alpina* is calcicole. They can be divided or raised from seed.

ADONIS, Ox-Eye. Bright and beautiful early-flowering Anemones with yellow, lilac, or red flowers which like light and sandy soil, sunny exposure, and can be grown from seed (slow germinating).

A. amurensis II-III; 15 cm.; yellow; Si.; 1.
A. apennina is an Italian form of *pyrenaica;* 6.
A. Bartlei III; 15 cm.; yellow; Ch.; 6.
A. chrysocyatus; IV; 15 cm.; yellow; Ch.; 6.
A. cœrulea; IV; 10 cm.; lilac; Ch.; 6.
A. pyrenaica V-VI; 20 cm.; bright yellow; Py., M. Al.; 6.
A. sibirica IV-V; 15 cm.; yellow; Si.; 6.
A. Sutchuensis III; 15 cm.; yellow; Ch.; 6.
A. vernalis III-IV; 1'5 cm.; bright yellow; S. Eur., Ca.; 1.
A. volgensis IV; 15 cm.; yellow; Or., Si.; 6.
A. Walziana; intermediate form between *vernalis* and *volgensis.*

ADOXA *moschatellina* is a little creeping herbaceous Honeysuckle with green flowers appearing in March-April and delicate light green foliage, not exceeding 5 cm. high, which grows in our country and likes the fresh shade of a garden.

ÆTHIONEMA. Silvery-Cress. Beloved wall or rock plants for sunny situations, with rather small pink or white flowers which are considered as "the most precious and exquisite queens of the rock garden" (Farrer). They all want sun and stony places; they can be increased from cuttings or very easily from seed. They like the limestone moraine and the very stony rock garden.

A. amœnum VI; 10 cm.; light rose; Or.; 4, 6.
A. Antilibani IV; 8 cm.; pale pink; Lib.; 4.
A. Antitaurii V; 8 cm.; pink; Or.; 4.
A. Bourgæi IV-V; 8 cm.; lilac pink; Or.; 4, 6.
A. cappadocicum IV-V; 10 cm.; light pink; Or.; 4; *.
A. cardiophyllum V; 15 cm.; pink; Or.; 4, 6, 10.
A. cordatum VII-IX; 15 cm.; yellowish white; Or.; 4, 6.
A. coridifolium (*Iberis jucunda*) V; rose; Or.; 4, 6.
A. creticum VI; 15 cm.; light rose; Or.; 4.
A. diastrophis V; 10 cm.; rose; Or.; 4, 6.
A. flavum VI; 20 cm.; light yellow; Or.; 4, 10.
A. Florariensis, a hybrid with bright pink flowers.
A. gracile (*A. persicum*) V-VII; 20 cm.; rose; E. Eur., Or.; 1, 4.
A. græcum V; 10 cm.; rose; Gr.; 1, 4.
A. grandiflorum V-VII; 25 cm.; bright pink; Persia; 4, 6.
A. heterophyllum V; 5 cm.; pink; Or.; 4, 6.
A. Iberideum VI-IX; 10 cm.; white; Or.; 1, 4.
A. oppositifolium V-VI; 15 cm.; pink; Leb.; 4, 10.
A. ovalifolium VI; 10 cm.; pink; Py., Or.; 1, 4.
A. pulchellum IV-V; 1·5 cm.; pink; Or.; 4.
A. pyrenaicum V-VII; 8 cm.; pink; Py.; 1, 4.
A. rotundifolium IV-IX; 8 cm.; light pink; Or.; 4, 10.
A. saxatile V-X; 10 cm.; rose; S. Eur.; 1, 4.
A. schistosum IV-V; 15 cm.; bright rose; Or.; 1, 4.
A. stylosum V; 10 cm.; rose; Leb.; 1, 4.
A. Thomasianum V-IX; 8 cm.; light rose; Ped. Al.; 1, 4, 10.

ÆTHEOPAPPUS *pulcherrimus* is a kind of Centaurea coming from the mountains near Erzeroum and whose stately height (1 m.) makes a good effect as a background for the rock gardens; flowers pink, in Centaurea-like head (June-Oct.).—*A.*

Balansæ from the high granitic mountains of Lazic Pontus (3000 m.) is a lower plant (15 cm.) with large heads of yellow flowers. Culture 1; division or seed.

AGATHEA (Felicia or Aster) *petiolata,* from S. Africa (Basutoland) is a nice and very free-growing pink Daisy, flowering from May till the winter when placed on a sunny bank or on a sheltered border; its long foliated stems are trailing, running, and hanging down often one metre long and giving masses of flowers. Can be increased from cuttings, layers, or seed.

AGAVE *Utahensis* and *virginica* are half hardy Agaves from the Western United States deserts; they can be grown on our rockeries if planted in a well-drained sheltered position and *Utahensis,* at least, covered through the winter in our climate.

AGRIMONIA, a genus of the Rosaceæ with bright yellow, sweet-smelling flowers; good for the shady garden or for the wild part of alpine scenes.

AGROSTIS *alpina* is a little grass with thin foliage (6-10 cm. high) which is used for covering the soil of the wild parts of the rockery.

AJUGA. An interesting group of Labiates, useful as creepers to cover the ground in large rockeries. Sir Frank Crisp at Henley had *A. Genevensis* in place of grass at the base of his beautiful alpine garden. All have blue flowers, *Genevensis* being the best coloured; the blue *A. reptans* and its varieties with variegated leaves, white or pink flowers, is very dwarf, creeping, and even a troublesome weed in certain cases. *A. Brockbanki* is a deep blue variety of *Genevensis* and *A. metallica crispa* has smooth, curled leaves of metallic sheen. *A. orientalis* from South and East Europe is a strong-growing species with downy foliage and blue flowers, and *A. pyramidalis,* from the subalpine regions of Europe, is a curious plant whose clear blue flowers are distributed around a thick and pyramidal column. Except the last, which wants culture No. 7, all are easily grown by No. 1 and can be used for carpeting. Division or seed.

ALCHEMILLA. Lady's Mantle. A little rosaceous plant with green inconspicuous flowers, but nice gay foliage. *A. alpina,* with its silky leaves, the lower surface silver white, is one of the dearest herbs of the alpine lawns. *A. fissa* and *pentaphyllea* are very dwarf gay green plants used in the acid soils for covering and carpeting the ground. They all belong to the alpine regions of Europe. Seed or division.

ALISMA *Plantago,* Water Plantain, has a tall branching stem, with a multitude of small light pink flowers, and large ovate leaves forming a tuft at the base; it grows in water or near the water. Seed.

ALKANNA *orientalis* is an Oriental big yellow-flowering Borage with rough greyish foliage blooming all the summer through and wanting a sunny place in the garden or in the rock garden. Seed.

ALLIUM. Garlic. Rather less decorative plants, but some of them are good for our gardens and should find their place even in the rock garden; they can be increased from seed or division.

A. cæruleum (*azureum*) VI; 25 cm.; blue; Si.; 1.
A. cyaneum VI; 15 cm.; deep blue; Ch.; 1.
A. flavum VI; 3 cm.; yellow; S. Eur.; 1.
A. giganteum VII; 1 m.; whitish; Si.; 1.
A. Karataviense VII; 40 cm.; white; Tu.; 1.
A. Moly VI-VII; 25 cm.; bright yellow; S. Eur.; 1.
A. Neapolitanum VI; 30 cm.; white; S. Eur.; 1.
A. oreophyllum VI; 30 cm.; purple; Ca.; 1.
A. Ostrowskyanum VII; 25 cm.; light carmine; Tu.; 1.
A. pedemontanum (*narcissiflorum*) V-VI; 15 cm.; pink; S. A.; 1, 6.
A. pulchellum VII; 25 cm.; rose; S. Eur.; 1.
A. Rosenbachianum V; 30 cm.; rose; Ch.; 1.
A. triquetrum V; 20 cm.; white; S. Eur.; 1.
A. ursinum IV; 20 cm.; pure white; Eur., Si.; 2.
A. Valdense VII; 8 cm.; pink; Ped. Al.; 1, 6.
A. Victorialis VIII; 50 cm.; greenish; Eur., As.; 1; M.

ALSINE. See ARENARIA.

ALYSSUM. Well-known Crucifers, of which many have long been grown in gardens and especially the "Goldentuft," *A. saxatile.* I remember, in my childhood, having seen the borders of my grandfather's garden framed with it and I never shall forget the glorious sight it was for my young brain. The Alyssums are generally saxatile plants with yellow or white flowers and haunt the rocks of the Mediterranean regions and of the Orient. Some are annuals and even troublesome weeds in a rock garden, but the great majority are good rock and wall plants for sunny places. Cuttings, division, or seed.

A. alpestre V-VII; 8 cm.; yellow; Al., Py.; 4, 6.
A. amanum V-VI; 15 cm.; yellow; Or.; 6.
A. Arduini V; 20 cm.; yellow; S. Eur.; 1.
A. argenteum V-IX; 30 cm.; yellow; S. Eur.; 1, 4, 6.
A. atlanticum IV-V; 15 cm.; gold yellow; S. Eur.; At.; 1, 4.
A. condensatum VI; 10 cm.; sulphur yellow; Or.; 4.
A. corsicum V-VII; 30-50 cm.; yellow; Co.; 4.
A. corymbosum V; 40 cm.; deep yellow; Or.; 1, 4, 6.
A. creticum V; 30 cm.; deep yellow; Or.; 1, 4.
A. cuneifolium V; 15 cm.; yellow; Py., Sp.; 4.
A. floribundum V; 15 cm.; light yellow; Or.; 1, 4.
A. gemonense (*edentulum*) VI-VII; 30 cm.; yellow; Tr., Ba.; 1.
A. halimifolium VII; 30 cm.; white; S. Eur.; 4, 6.
A. Idæum V; 5 cm.; yellow; Or.; 4, 6.
A. (*Berteroa*) *incanum* VI-IX; 40 cm.; white; Eur., Si.; 1.
A. Lapeyrousianum VII; 30 cm.; white; Py., Sp.; 4, 6.
A. leucadenum VI-VII; 30 cm.; yellow; Ab., Ap.; 1, 4.
A. longicaule VI; 10 cm.; yellow; Sp.; 1, 4, 6.
A. macrocarpum VI-VII; 20 cm.; white; S. W. France; 4.
A. maritimum VII-X; 15 cm.; white; S. Eur.; 1, 4, 6 (biennial).
A. minimum VI; 8 cm.; yellow; Ba.; 4.
A. Moellendorfianum VI-X; 5 cm.; yellow; Tr. 4, 6.
A. montanum VI-IX; 10 cm.; bright yellow; S. Eur.; Or.; 1. 4.
A. murale VI; 20 cm.; yellow; E. Eur.; 4.
A. nebrodense VII; 20 cm.; yellow; Etna; 6.
A. obovatum (*obtusifolium*), oriental variety of *alpestre.*
A. orientale VII; 30 cm.; yellow; Ba., Or.; 1.
A. ovirense is a local form from the high Obir of Wulfenianum.
A. oxycarpum VII; 20 cm.; light yellow; Or.; 4, 10.
A. præcox V; 30 cm.; yellow; Or.; 4.
A. pyrenaicum VII; 8 cm.; white; Py.; 4, 6, 10; L.
A. repens VI; 10 cm.; yellow; Tr., Gr.; 4, 6.
A. Robertianum V; 20 cm.; bright yellow; Co.; 4.
A. Rochelianum; a variety of *A. repens* with larger flowers.

A. rostratum VII; 25 cm.; yellow; Or., Ca.; 1, 4.
A. rupestre VI; 20 cm.; white; Ab.; 4.
A. saxatile IV-VI; 25-30 cm.; bright yellow; E. Eur.; 1, 4. (With vars.: *fl. pleno, fol. variegatum, nanum,* and *citrinum.*)
A. scardicum V; 10 cm.; yellow; Or.; 6.
A. serpyllifolium V-VII; 8 cm.; light yellow; W. A.; 4.
A. speciosum VI; 25 cm.; yellow; Atl.; 1.
A. speciosum roseum; the same with pink flowers. Atl.
A. spinosum VI-IX; 15 cm.; white; S. Eur.; 1, 4, 6.
A. suffrutescens VII; 25 cm.; yellow; Lib.; 4.
A. tortuosum VI; 25 cm.; yellow; Gr.; 1, 4.
A. transylvanicum V; 20 cm.; yellow; Tr.; 1, 4.
A. turkestanicum V; 15 cm.; yellow; Tu.; 1.
A. Wiersbickii VI-IX; 50 cm.; yellow; S. Eur., Or.; 1.
A. Wulfenianum V; 8 cm.; bright yellow; W. Al., Ba.; 4, 6.

AMPHICOME *arguta* is a rare and beautiful bignoniaceous plant, near to Incarvillea, with fine dark green shining, elegantly cut leaves and pink flowers at the end of the slender stems (30 cm.); it comes from the high regions of Kumaon (Himalayas—2500 m. alt.) and is fairly hardy with us. *A. Emodi* with hairy foliage and larger flowers is seldom seen in gardens; it comes from the high summits of Afghanistan, about 3000 m. altitude. Both are increased from seed.

AMPHORICARPUS *Neumaveri,* from the Dalmatian mountains, is a kind of Centaurea, 10 cm. high, with purplish white flowers; 1, 4. Seed.

AMSONIA. Herbaceous half shrubby Periwinkles belonging to N. Am.; tall and leafy with curious violet-lilac flowers in heads. They like sun and light soil and can be divided or raised from seed.

ANAGALLIS *tenella* is a nice little creeping primulaceous plant covering and carpeting the soil with its flat branches, set with rounding pairs of leaves, and literally powdered, all the summer through, with numerous little pale pink flowers. It likes cool and damp situations; a native of W. Eur. *A. linifolia* (The Scarlet Pimpernel) S. Eur., is one of the brightest and best flowers for the summer; it looks like a miniature shrubby plant, with red stems set with shining, dark green leaves and bearing, all the summer and till the late autumn, bright crimson red flowers which need the sun's rays to keep their splendour; cuttings, division, or seed. The beautiful *A. grandiflora, Philippii,* and *fruticosa* are biennials.

ANAPHALIS *margaritacea, A. Jedœnsis,* and *Japonica* are "everlasting" white flowers, from Asia and N. Amer., near to the Antennaria, forming large bushes of silver-grey leaves with stems rising to 1 m. high. They like sunny places. Division or seed.

ANARRHINUM *bellidifolium* is a dear little scrophulariaceous plant near to the Antirrhinum, belonging to S. W. Eur., from whence it reaches to our sunny hills near Geneva. The plant has nice foliage and very thin, light blue flowers (VI-VII) in slender spikes (30 cm.), and wants a sunny place. Seed.

ANCHUSA. Big and strong Borages of S. Eur. and Or.; the well-known *A. italica* and its varieties (Dropmore, Floraire, Opal) find their place in the herbaceous border or in the wild garden. *A. myosotidiflora* from the Caucasus is one of the best azure-blue flowers for shady places in the rock garden or in the border. Seed.

ANDROMEDA *polifolia;* dwarf and slender shrub 20-30 cm. high, creeping through the sphagnum marshes of Eur. and in the boreal and arctic regions; the leaves are narrow, hard, bluish underneath; the flowers pale pink, globular, and numerous (V-VII). It wants to be grown in the bog, in peat, or in sphagnum, being a lime-hater; sunny situation. Its cousin, *A. nana,* from Spitzbergen, is dwarfer and carpeting the soil, not exceeding 10 cm., with light rose flowers.

ANDROSACE, which are the dwarfest of the Primulaceæ, are the most characteristic of the alpine plants and can be considered as typical of the high alpine flora. They are the true "Flowering Moss," the quintessence of everything brilliant and beautiful that is found in the flora of the high mountain ranges. They can be, from a cultural point of view, divided into two classes: those suitable for open and flat ground, growing between grass or rocky and turfy declivities; and the saxatile group called Aretia which are found only in clefts of rocks. The *Douglasia* from N. America and *Gregoria* are included in this second group.

In the first category the kinds we grow in gardens are only a small part of those which can be seen as dried specimens in the herbaria. We do not describe the annual ones which are: *A. albana, armeniaca, Arizonica, Chaixii, elongata, filiformis, lactiflora, macrantha, maxima, multiceps, occidentalis, pulverulenta, Raddeana, Reverchoni, rotundifolia, Saxifragæfolia, septentrionalis.*

The Androsaces of the first group (terrestrial) are generally creeping, stoloniferous, and have a branching rootstock; they can be increased by division or raised from seed. They require a flat, level spot or a steep, well-drained area in the rockery. Some can be used for the wall garden. They make clumps, are less compact and less dense than those of the Aretia group; their flowers are produced in small clusters, not solitary as in the second group.

A. arachnoidea V; 5 cm.; white; Tr.; 8.
A. brigantiaca (*carnea* var. *brigant.*) IV; 10-15 cm.; pale pink; W. Al.; 8.
A. Bulleyana VII; 10 cm.; orange red; Y.; 8.
A. carnea IV; 10 cm.; bright pink; Al., Py.; 8; P.
A. chamæjasme V; 5 cm.; white and pink; Al., As., A. R.; 8.
A. Chumbyi V-IX; 8 cm.; bright pink; H.; 8.
A. coccinea VI; 10 cm.; scarlet; Y.; 8.
A. foliosa V-VIII; 20 cm.; rose lilac; H.; 4, 6.
A. geraniifolia V-IX; pink; H.; 8.
A. Halleri IV; a long-leaved *carnea* from French mountains; P.
A. Hedræantha IV; 10 cm.; light rose; Ba.; 8, 10.
A. Henryi (*Primula Potanini*) V; 20 cm.; pale lilac; Ch.; 8, 10.
A. Hookeriana V; 8 cm.; pink; Ch.; 8, 10.
A. lactea IV; 15 cm.; pure white; Al., J., Cp.; 6; L.
A. Laggeri III; 5 cm.; bright pink; Py.; 6, 8, 10.
A. lanuginosa VI-X; 10 cm.; lilac; H.; 1, 6.
A. longifolia V; 20 cm.; light rose; Ch.; 8.

A. obtusifolia IV-V; 5 cm.; white; Al. Cp.; 6, 10.
A. oculata (*Laichtlini*) VI-XI; 8 cm.; light rose; H.; 6.
A. pedemontana is a natural hybrid *carnea* x *obtusifolia.*
A. pennicellata is an Oriental form of *villosa;* L.
A. primuloides VIII; 10 cm. lilac; H. 6.
A. rotundifolia VI; 20 cm.; rose; H.; 6, 8.
A. sarmentosa V-VIII; 15 cm.; lilac; H.; 6.
A. sempervivoides VII-IX; 10 cm.; lilac; H.; 6.
A. spinulifera V; 25 cm.; carmine; Ch.; 6.
A. strigillosa VIII; 15 cm.; lilac; H.; 6.
A. tibetica V; 8 cm.; rose; H.; 8.
A. villosa IV-V; 5 cm.; pink and white; Eur., As.; 6; L.
A. vitaliana (*Douglasia vit.*) II-IV; 5 cm.; bright yellow; S. Eur.; 4, 6.
A. Watkinsii V; 10 cm.; carmine; H.; 8.

The second group (Aretia), has a one-flowered short stem or without stem; plants in dense cushions; all saxatile; suitable for walls or vertical position between rocks, or even for culture in pots, in pans, or on the moraine. Propagation by cuttings or seed.

A. Charpentieri V; 3 cm.; carmine; It.; 4, 8, 10; L.
A. ciliata III-IX; 3 cm.; dark pink; Py.; 4, 8, 10.
A. cylindrica V; 3 cm.; white; Py; 4, 8, 10; L.
A. Delavayi V; 8 cm.; pale pink; Y.; 8, 10.
A. glacialis (*alpina*) IV-V; 3 cm.; pink; Al.; 4, 8, 10; P.
A. Hausmanni IV-V; 3 cm.; light rose; E. Al.; 4, 8, 10; L.
A. Heerii is a hybrid, *A. Helvetica* x *glacialis,* with pink flowers.
A. Helvetica IV-V; 4 cm.; pure white; Al. Cp.; 4, 8, 10; L.
A. hirtella IV-VI; 3 cm.; pure white; Py.; 4, 8, 10; L.
A. imbricata (*argentea, tomentosa*) V; 2 cm.; white; Al. Py.; Sp.; 4, 10; P.
A. lævigata (*Douglasia læv.*) V; 5 cm.; pink; R. M.; 4, 10.
A. Mathildæ V; 8 cm.; white; Ab.; 4, 8, 10.
A. prætutiana is a Spanish form of *vitaliana.*
A. pubescens V; 3 cm.; white; A., Py.; 4, 10; L.

A. pyrenaica III-V; 2 cm.; pure white; Py.; 4, 10; P.
A. Wulfeniana (*Pacheri*) IV; 4 cm.; pink; E. Al.; 4, 8, 10.[2]

ANDRYALA. See HIERACIUM.

ANEMONE, Wind-Flower, is a large group of mountain and wood plants growing seldom on rock soil, and of which few are saxatile. We may divide them, from a cultural point of view, into four different groups: 1.—the wood plants, which generally grow on shady places and form large colonies—their types are *A. nemorosa,* the common Wood Anemone, and *A. sylvestris;* 2.—the Hepatica group; 3.—the alpine and mountain Anemones; 4.—the Hortensis group, belonging to the Mediterranean regions.

The first group wants half shade, light leaf mould and sand, and is propagated from seed (rather slow germinating) and division; some are half tuberous and others stoloniferous.

A. altaica V; 25 cm.; pinkish white; Si.; 1.
A. apennina IV; 10 cm.; blue lilac; S. Eur., Or.; 1. (Some varieties with different shades in the flower.)
A. Baïkalense is an Asiatic form of *sylvestris.*
A. Baldensis V; 10 cm.; white and pink; A. Py., Cp.; 6, 10.
A. blanda III-IV; 10 cm.; blue; Or.; 1, 2; many garden varieties of which *scythinica,* dark blue, is the best.
A. borealis IV; 15 cm.; pure white; Ar. R.; 6.
A. cœrulea IV; 10 cm.; blue lilac; Si.; 1, 2.
A. caroliniana V; 15 cm.; lilac; N. Am.; 1, 2.
A. caucasica is an intermediate form, *blanda* x *apennina.*
A. cylindrica VI; 50 cm.; greenish; N. Am.; 1.
A. decapetala V-VI; 15 cm.; sulphur yellow; S. Am.; 1.

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[2] For more particulars on Androsace see Pax and Kunth: Primulaceæ in Engler's *Pflanzenreich,* IV, 237, Leipzig, 1905.

A. demissa V; 15 cm.; light lilac; Y.; 6.
A. dichotoma (*A. canadensis, A. Pennsylvania*); VIII; 50 cm.; white; N. Am.; 1.
A. Drummondi is the Rocky Mountain form of *Baldensis;* 10.
A. flaccida VI; 15 cm.; pure white; Ch. Jap.; 1, 2.
A. globosa VI; 50 cm.; bright pink; N. Am.; 1.
A. Griffithii is an Himalayan form of *A. nemorosa.*
A. Hudsoniana VII; 30 cm.; white; N. Am.; 1', 7.
A. intermedia IV; 10 cm.; light sulphur yellow; Eur.; 1, 2.
A. magellanica VI; 15 cm.; light rose; S. Am.; 6.
A. mexicana IV-V; 20 cm.; pink; Mexico; 2, 3; L.*
A. multifida VI; 20 cm.; greenish white; N. Am.; 1, 2.
A. narcissiflora IV-V; 30 cm.; pink and white; Eur., A. R.; 1, 7; L.
A. nemorosa III-IV; 15 cm.; pinkish white; Eur., As., N. Am.; 1, 2. (Numerous varieties: *Allenii, Blue Bonnet, bracteata, cœrulea, fl. pleno, grandiflora, Robinsoniana, rosea,* etc.)
A. nikoensis is the Japanese form of *nemorosa.*
A. polyanthes VII; 30 cm.; whitish pink; H.; 6.
A. Raddeana IV; 20 cm.; white; Ch.; 1, 2.
A. ranunculoides IV; 15 cm.; bright yellow; Eur. Si.; 1, 2, 3. (A good double form is *A. ranunculoides fl. pleno.*)
A. rivularis VI-IX; 30 cm.; white; H.; 1, 2.
A. rupicola VIII; 30 cm.; white; H.; 6.
A. sylvestris VI-IX; 30 cm.; white; Eur. Si.; 1. (Varieties *fl. pleno* and *grandiflora.*)
A. trifolia III; 10 cm.; white; E. Al.; 1, 2.
A. udensis V; 15 cm.; white; Si.; 1, 2.
A. virginiana VII; 30 cm.; yellowish; N. Am.; 1'.

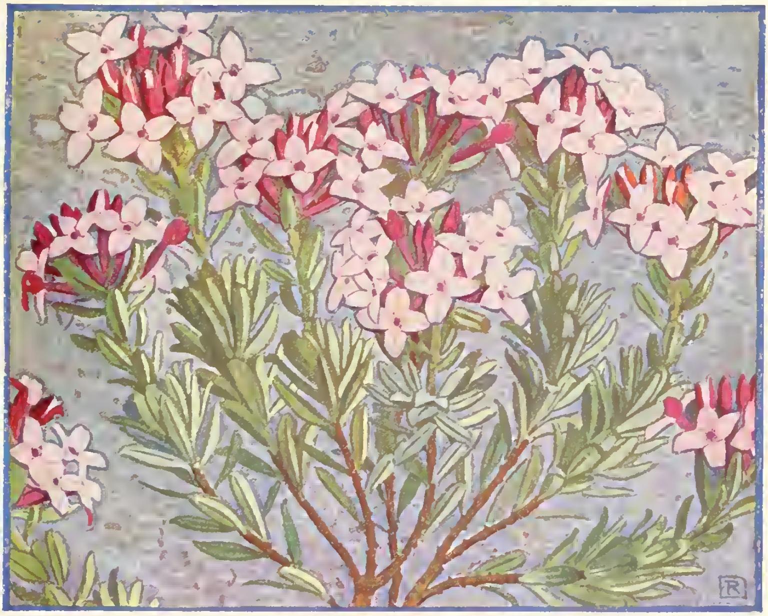
The Hepatica are few; but they are perhaps the most beloved of all for their precocity. They generally grow on limy soil and half-shady places—in the granitic Alps of Valais, for instance; the flowers are white or light pink. In the garden they like leaf mould and sand and are good subjects for half-shady underwoods; they do not like to be disturbed or divided. Propagation from seed (slow germinating).

A. Hepatica (*Hepatica triloba*) is the type of this group. It flowers from February to April and is one of the joys of the early spring. The leaves are three-lobed and thick, and come after the flowers, which are blue, lilac, pink, light rose or white, single or double. It prefers lime and belongs to the mountain regions of Europe. It can be found in some parts of N. Am., but it is there generally replaced by its cousin, *A. acutiloba,* a bigger plant with light rose flowers.

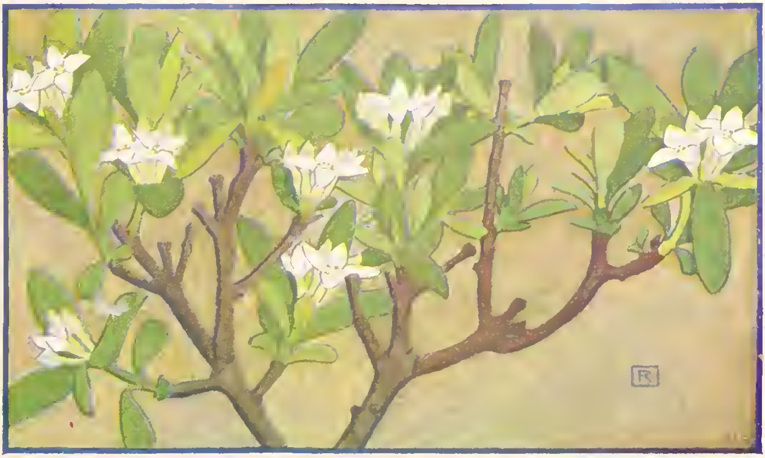
A. angulosa (*A. transylvanica*) E. Al.; has big bright blue flowers; its leaves are more divided, and the plant is bigger in all its parts. There are white, pink, and big flowered varieties.

The alpine and mountain Anemones have generally long taproots (15-25 cm.) and belong to the group *Pulsatilla.* They are certainly the finest of all if not the brightest. The types *alpina, sulfurea, Pulsatilla, patens, vernalis* are real splendours and, if seen in their flowering time, these fields of white, purple, or sulphur yellow cups with golden sheaves at the centre are really royal majesties. They can hardly be transplanted from Nature unless you find young plants; but they come easily from seed which must be sown immediately after ripening; if not they are slow germinating, but they do all come up, after 12 months or longer time. They, the alpine species, like a deep, light soil, fresh and spongy, and a half-shady situation.

A. ajanensis IV; 15 cm.; reddish purple; Si.; 8.
A. albana V; 15 cm.; light lilac; Ca. Or.; 1.
A. alpina IV; 60 cm.; white and azure; Eur., N. Am.; 2, 6; L.
A. amœna III; 20 cm.; light purple; W. Al.; 1.
A. amurensis IV; 10 cm.; white; Si.; 1.
A. armena IV; 20 cm.; deep violet; Or.; 1.
A. Bungeana V; 15 cm.; yellow; Si.; 1, 6.
A. Burseriana is an Oriental variety of *alpina.*
A. cernua VI; 30 cm.; dark purple; Jap.; 1.
A. chinensis IV-V; 25 cm.; bright purple; Ch.; 1.
A. dahurica VI; 25 cm.; light violet; Si.; 1, 6.



Daphne cneorum



Daphne alpina

A. georgica IV; 15 cm.; bright purple; Or.; 1.
A. grandis IV; 30 cm.; rich purple; Styria; 1.
A. Halleri IV; 25 cm.; bright lilac; Al.; 6; P.
A. Kostysczeuri VI; 25 cm.; violet; Ch.; 1.
A. montana III; 20 cm.; dark purple; S. Eur.; 1; P.
A. nuttaliana IV; 20 cm.; sulphur yellow; N. Am.; 1.
A. occidentalis V; 25 cm.; white; R. M.; 1, 6.
A. patens IV; 20 cm.; lilac; Eur., Si., N. Am.; 1.
A. pratensis IV; 30 cm.; dark purple; Eur.; 1; P.
A. propera; large purple blue var. of *Pulsatilla;* E. Al.; 1.
A. Pulsatilla (Pasque Flower) III-IV; 25 cm.; rich purple; Eur., Si.; 1, 2. (Varieties with white and pink flowers.)
A. Regeliana V; 15 cm.; blue lilac; Ch.; 1.
A. rubra IV; 30 cm.; deep red; W. Al.; 1; P.
A. rupicola VI; 30 cm.; white; H.; 1, 6.
A. sulphurea IV; 50 cm.; light yellow; granitic Alps; 6, 8; P.
A. vernalis III; 10 cm.; opal coloured; Eur., A. R.; 6; P.

The Hortensis group contains the Mediterranean and Oriental bright-coloured Anemones; they have tuberous roots and want rich garden soil in a hot and very sunny situation; they rest after the flowering time. Propagation from seed or division of the tuber. They are variable in forms (double or single) and colours; they have been grown in gardens for centuries for early spring decoration and were formerly much appreciated. The fields of *A. fulgens, coronaria,* and *stellata* are one of the beauties of S. Europe. They want a well drained, rich soil, a very sunny situation, and rest after flowering. Division of tuber or seed.

A. coronaria IV; 25 cm.; red, pink, blue, or white; S. Eur.; 1. (Single and double vars.)
A. fulgens IV; 25 cm.; bright scarlet; S. Eur.; 1.
A. pavonina IV; 30 cm.; bright cinnabar red; S. Eur.; 1.
A. stellata (*A. hortensis*) IV; 15 cm.; reddish lilac; S. Eur.; 1.

There is a fifth group which concerns rather the perennial borders (*A. elegans, Hupehensis, Japonica,* and *vitifolia*), all Asiatic big and invading plants.

ANEMONOPSIS *macrophylla* is a Japanese Ranunculad, delicate in form and in colour, growing to 80 cm. high; the leaves are those of Actæa and the nodding flowers are of an exquisite form and colour, with waxy white petals margined with light purple. It is a beauty of rather difficult growth; at Floraire we can keep it only with great care. It wants peat and a half-shady situation. Seed.

ANEMOPSIS. See HOUTTUYNIA.

ANGELICA. Big, aromatic Umbellifers good for wet places in a large rockery; *A. Archangelica, A. Razulii,* and *A. sylvestris* are the best known.

ANTENNARIA, Cat's-Ears, are dwarf everlasting. Composites with silky and silver-white foliage, creeping over the soil, carpeting the dry, rocky places of the mountains and the sunny hills, bearing their flowers, white, pink, or deep carmine, in little heads. Propagation by division or seed.

A. arctica V; 8 cm.; brown red; A. R.; 1.
A. alpina IV-VI; 10 cm.; white; Al. Eur.; 1.
A. carpathica V; 10 cm.; whitish; Eur.; 1, 6.
A. dioica V-VI; 10 cm.; pink, white, or carmine; Eur., Si.; 1.
A. plantaginea V; 25 cm.; whitish; S. Am.; 1.
A. triplinervis VI; 20 cm.; white; H. 1.

ANTHEMIS. Camomile. Rather confused in gardens. Many are annuals or biennials, but there are several mountain species which are recommended for their profusion of flowers, white or yellow, and their hardiness. All want sunny, rather dry situations and light ground. Cuttings, division, or seed.

A. ætnensis VI; 25 cm.; white; Etna; 8.*
A. aizoon. See *Achillea.*
A. Barrelieri VI; 30 cm.; white; Ap. Ab.; 1', 6.
A. Biebersteiniana VI; 20 cm.; bright yellow; Ca.; 6.
A. carpathica VI; 25 cm.; white; Cp.; 1.
A. cinerea VII; 25 cm.; white; Ba.; 1.
A. cupaniana VI-IX; 30 cm.; white; Ap.; 1.
A. Kitaibeliana VII; 25 cm.; white; Cp.; 1.
A. Kotschyi VI; 30 cm.; yellow; Or.; 1.
A. macedonica is a dwarf form of *montana.*
A. montana V-IX; 30 cm.; white; S. Eur.; 1.
A. nobilis is the Camomile of medicine.
A. rigescens V-X; 50 cm.; yellow; Ca.; 1.
A. Styriaca V-IX; white; E. Al.; 1.
A. tenuifolia IV; 20 cm.; white; Tr.; 6.
A. tinctoria V-X; 40 cm.; bright yellow; Eur.; 1. (Numerous vars.: *alba, Kelwayi, pallida,* etc.)

ANTHERICUM. This is a group of small Lilies with white flowers; the large flowered ones are referred to as Paradisia. *Anthericum ramosum* is what we call in our mountains the "Rock-Lily"; it grows on the stony slopes of our chalky mountains and is in such quantity that the masses of its small, pure white flowers with gold anthers have the aspect of a white flax field. They flower all summer through and like a sunny position in the rockery or in a dry Swiss meadow; the stem ascends to 30 cm. *A. algeriense* is a North Africa form with big flowers, and *A. arethusa* is a hybrid with big flowers, *A. ramosum* x *Paradisia Liliastrum.* Seed, slow germinating.

ANTHYLLIS, of the Papilionaceæ, is a sweet little genus of rock plants. *A. montana* is the best type, especially its deep carmine-red variety of the south of France (*A. montana carminea*). They want a sunny position in the rockery and can be grown as borders in beds of perennials. *A. montana* belongs to S. Europe and Mediterranean limestone hills and low mountains. It sometimes covers large spaces of ground with its silver-grey leaves and pink, very sweet-smelling flowers. Propagation from cuttings, division, or seed. *A. Jacquini* from the Dolomites and surrounding ranges is deep purple-red flowered. The common Lady's-Fingers (*Anthyllis vulneraria*) is well known, being an herb often used in medicine; it has yellow flowers and silver-whitish leaves. It has many forms: *alpestris,* with white and pink flowers; *Dillenii,* with red flowers; *minor,* which is a dwarf variety with pink flowers; *Illyrica,* with violet-lilac flowers, etc. Seed.

ANTIRRHINUM, Snapdragon. This is a well-known group of garden plants, giving us a large number of varieties in the finest colours. The wild type of *A. latifolium,* with yellow flowers, is common in S. France and its cousin, *A. majus,* with bright carmine or crimson flowers, grows on the barren slopes of the Pyrenees and all over the Mediterranean regions. I found it extraordinarily luxuriant in the woods of the mountains near Ax-les-Thermes (Ariège) and all about the E. Pyrenees. But the best of these Snapdragons, or at least the brightest of all, is certainly the very narrow-leaved *A. tortuosum* which haunts certain walls of S.

Europe with its brilliant crimson flowers. It is not quite hardy in Geneva but can be sown every year, as it is a quick growing and rich flowering plant. The following Antirrhinums are hardy rock plants; they generally want sunny situation, rock fissures, and can be increased from seed or cuttings:

A. asarina IV-X; 5 cm.; pale yellow; Py., Sp.; 4, 6.
A. Barrelieri VI; 50 cm.; yellow or pink; W. S. Eur.; 1.*
A. glutinosum V-X; 1·5 cm.; pale yellow; Sp.; 4.
A. molle V-VIII; 30 cm.; yellow and white; Py., Sp.; 4.
A. sempervirens VI-VIII; 25 cm.; yellowish white; Py.; 4; L. (A variety with deep crimson flowers is called *A. semp. roseum.*)
A. siculum IV-X; 40 cm.; whitish yellow; Py., It.; 1, 4.

APHYLLANTHES *monspeliensis* is a cousin of the Lily; glaucous grey, very stiff foliage, growing on the barren and dry slopes of S. France and of the Mediterranean region. The flowers are small blue stars very numerous and nice, adorning the sterile land and giving to the whole landscape, like in a mirror, the reflection of the sky. This very curious rushlike plant, in appearance destitute of leaves and sometimes of life, is one of the marvels of the South. It can be considered as the Sisyrinchium of Europe. Easy to cultivate; give it a dry, gritty, stony, well-drained soil in a very sunny position and it will grow. Propagation by division or seed (slow germinating).

APOSERIS (HYOSERIS) *fœtida* is a yellow-flowering Composite of the dark woods in the chalky mountains of Europe, a kind of "Dandelion" with elegant foliage and bright yellow head; it has the great advantage of being one of the few plants capable of growing under the Spruces and in deep shade. Division or seed.

Aquilegia. Columbine. Old Horace, 2000 years ago, said:

> *"Neque imbellem feroces*
> *Progenerant aquilæ columbam."*

But, nowadays, despite the Roman poet, the eagle and the dove are connected together in a flower; and what a flower! This is one of the most beloved of the wild flowers in our gardens. Not only for the rockery but for the borders we find in all the Columbines charming elements of graceful forms and of discreet and beautiful colours. The Columbines are very old inhabitants of gardens. In his *History of Plants,* Gerard (1597) figured *Aquilegia cærulea* and *vulgaris rubra,* and Parkinson described the double form.

Flowering as they do from the end of April to July, the Columbines come just at a time when we want such graceful flowers in our beds if not always in the rockery. I remember in my young days the Columbines in my grandfather's border as one of the sweetest flowers; they were hybrids, and offered all the shades between azure blue and pure white, red, and purple. The best way, says the Rev. C. Wolley Dod, to have fine plants of Aquilegia, consists in growing them fast and large without a check during their first year; they are generally, at least the hybrids and garden varieties, not long lived, 4-5 years, not more. But the types like *vulgaris, alpine, pyrenaica* endure longer. They ought to be sown early in the spring or late in the autumn and do not like to be transplanted after they are one year old; they cannot be divided, at least here. As for position, they do not stand exposure to sun and high wind and they generally like a sheltered and rather shady, fresh, but not wet place. They succeed especially well in mountain gardens, and in our alpine nursery at "La Chèvrerie," they are splendid. Mr. Gilbert Baker in the *Gardeners' Chronicle*[3] described the genus Aquilegia after the system of Dr. de Borbas of Budapest, but this is no more used. The American Columbines have the peculiarity of bearing long—sometimes very long and slender—spurs; these are Aquilegia *arctica* (*formosa*), *californica, canadensis, chrysantha, cœrulea* (the Colorado state flower), *flavescens, pauciflora, pubescens,* and *Skinneri.* That long spur gives to the flower a very elegant aspect and a graceful silhouette. They have been crossed with our European Columbines and the results of this are the delightful strain called Haylodgensis, Jæschkani, etc.

The Columbines are very variable and polymorphic and they cross with the greatest facility. If you will get good varieties, pick out all the inferior and small-flowering plants and every doubling form (they are especially ugly). It must be done in the early morning, before the bees and the wasps visit the flowers. If perchance a certain shade is too weak in your strain—for instance, if the blue is badly represented—plant more *A. cærulea* or *glandulosa* in the bed; if the red is missing or too pale, plant *A. canadensis* or *formosa,* but not too many, as their pollen is very strong and powerful. If the spurs are too short, add some North American kinds.

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[3] *Gard. Chronicle,* London, 28 Oct., 1882, p. 553.

In 1883, Mr. E. G. Loder, at Weedon (England), obtained such a marvellous collection of hybrids (*cærulea* x *chrysantha,* etc.) that it was considered as the most beautiful picture in the garden world of Europe. He had several acres of ground covered with thousands of flowers of all the most delicate shades mixed, and these flowers measured sometimes 10 cm. in diameter. They must be raised from seed.

The seeds of Aquilegia are poisonous; in the North Asiatic kinds, only, the seeds are not shining but unpolished. The true *A. glandulosa* and *viridiflora* may be recognised from the seeds, yet they are generally sent wrong by the nurseries.

A. alpina V; 25 cm.; azure blue; Al., Eur., Si.; 6, 9, 10.
A. Amaliæ IV; 25 cm.; white and blue; Gr., Or.; 6.
A. arctica. See *A. formosa.*
A. atrata IV; 60 cm.; dark brown; Eur.; 1; L.
A. atropurpurea IV; 30 cm.; purple and yellow; Si.; 6; P.
A. aurea V; 15 cm.; light yellow; Or.; 1.
A. Benacensis (*A. glutinosa*) VI; 20 cm.; deep blue; Tyrol; 4, 6.
A. Bernardi VI; 50 cm.; blue; Co.; 6.

A. Bertoloni V; 20 cm.; pure blue; It. Al.; 6.

A. brevistyla (*A. saximontana*) V; 15 cm.; pale blue; R. M.; 6.

A. Burgeriana V; 50 cm.; purple blue; Jap.; 1.

A. californica (*A. truncata*) V; 50 cm.; scarlet; N. Am.; 1. (And vars.)

A. canadensis V; 25 cm.; cinnabar red; N. Am.; 1, 6. (Var. *nana.*)

A. caucasica. See *A. Olympica.*

A. chrysantha VI; 60 cm.; light yellow; R. M.; 1. (Numerous varieties and hybrids with *californica* and *cærulea* (*Haylodgensis* and others.)

A. cærulea V-VI; 35 cm.; azure and white; R. M.; 1, 6; P.

A. desertorum VII; 12 cm.; red and yellow; New Mexico; 4, 9.

A. dichroa V; 30 cm.; pink and white; Portugal; 1.

A. discolor V; 10 cm.; dark blue and white; Sp.; 4, 6.

A. ecalcarata V; 20 cm.; claret and rose; Jap.; 1.

A. Einselneana V; 20 cm.; blue; E. Al.; 1, 6.

A. flabellata IV-V; 15 cm.; pure white; Jap.; 1. (Var. *grandiflora* and *nana.*)

A. flavescens V; 25 cm.; lemon yellow; N. A.; 1.

A. formosa (*arctica*) VII; 50 cm.; scarlet and green; N. A.; 1.

A. fragrans V; 45 cm.; cream white; H.; 6; P.

A. glandulosa VI; 40 cm.; blue and white; Si.; 6 P.

A. grata IV; 30 cm.; blue; E. Eur.; 1, 4.

A. Hænkeana V; 25 cm.; blue; E. Al.; 1, 6.

A. Haylodgensis; garden hybrids of great beauty.

A. Jæschkani is a hybrid, *chrysantha* x *Skinneri.*

A. Jonesii V; 20 cm.; sky blue; N. W. Wyoming; 1, 6.

A. jucunda V; 50 cm.; blue; Si.; 1, 6.

A. Karelini V; 40 cm.; deep blue; Tu.; 1.

A. Kitaibeli V; 25 cm.; deep purple; E. Al.; 4.

A. lactiflora VI; 50 cm.; pure white; Si.; 6, 9.

A. leptoceras; a Siberian form of *vulgaris.*

A. lithophila V; 30 cm.; yellow; R. M.; 6.

A. longicalcarata V; 15 cm.; white and blue; Si.; 1, 6.

A. longissima IX-X; 30 cm.; light yellow; R. M.; 6.

A. lutea V; 30 cm.; yellow; Ba.; 1.

A. nevadensis IV; 15 cm.; blue; Sp.; 1, 6.

A. nigricans V; 40 cm.; dark red; E. Eur.; 1.

A. nivea is a pure white, big-flowering *vulgaris.*

A. Olympica V; 25 cm.; blue and white; Gr., Or.; 1.

A. othonis V; 40 cm.; blue; Ba.; 1.

A. oxypetala V; 25 cm.; blue and yellow; Si.; 1.

A. pauciflora VI; 30 cm.; yellow; Cal.; 1, 6.

A. pubescens VI; 40 cm.; yellow; R. M.; 4, 6.

A. pubiflora V; 35 cm.; sky blue; H.; 6.

A. pyrenaica V-VI; 20 cm.; bright blue; Py.; 1, 4; L.

A. Reuteri VI; 30 cm.; blue; M. Al.; 1, 6.

A. sibirica V; 30 cm.; blue and white; Si.; 1.

A. Skinneri VI; 40 cm.; scarlet and green; Mex., S. Am.; 1.

A. stellata is a spurless *vulgaris.*

A. Stuartii is a splendid hybrid, *glandulosa* x *Olympica;* 6, 9.

A. thalictrifolia V; 15 cm.; blue; E. Al.; 1, 6.

A. transylvanica IV; 25 cm.; sky blue; E. Al.; 1, 6.

A. truncata. See *A. californica.*

A. Vervæneana is a garden variety with variegated leaves.

A. viridiflora V; 30 cm.; greenish brown; Si.; 6; P.

A. viscosa V; 30 cm.; lilac purple; Eur.; 1.

A. vulgaris IV-V; 30 cm.; purple blue; Eur.; 1. (Numerous varieties.)

A. Wittmanniana. See *Olympica.*

ARABIS, Wall-Cress, is an old friend of every gardener and supplies good plants for the rock garden; they belong to the Crucifers and have white, bluish, or pink flowers. They are easily grown and bloom generally in early spring; the bees are very fond of some of them. Seed, cuttings, or division.

A. albida II-IV; 20 cm.; white; Ca.; 1, 4. (A good var. with double flowers and another with variegated leaves.)

A. Allionii IV; 20 cm.; white; Al.; 1.
A. alpestris IV; 30 cm.; white; Al.; 1.
A. alpina III-IV; 15 cm.; white; Eur., As., N. Am.; 1, 4. (Var. *grandiflora, rosea,* and *superba.*)
A. androsacea IV; 30 cm.; white; Or.; 6.
A. arenosa IV-V; 20 cm.; pink; Eur.; 1, 4; L; biennial.
A. aubrietioides IV-V; 20 cm.; pale pink; Or.; 1, 4.
A. bellidifolia V; 20 cm.; white; Al., Py., Cp.; 3, 6.
A. Billarderi IV; 10 cm.; pink; Lib.; 1, 4, 6.
A. blepherophylla V; 15 cm.; pink; R. M.; 6; P.
A. bryoides V; 5 cm.; white; Mt. Athos; 4, 6.
A. Carduchorum (*Draba gygas*) IV; 6 cm.; white; Or.; 1, 4.
A. cærulea IV; 8 cm.; bluish lilac; Al.; 6; L.
A. caucasica III-V; 20 cm.; yellowish white; Ca.; 1, 4.
A. cenisia V; 10 cm.; white; Ped. Al.; 4.
A. digenea IV; 15 cm.; white; E. Al.; 4, 6.
A. drabæfolia. See *A. bryoides.*
A. Drummondi VI; 30 cm.; white; N. Am.; 1, 6.
A. Ferdinand-Coburgi V; 15 cm.; white; Ba.; 4, 6.
A. glareosa V; 10 cm.; pink; Tr.; 4, 6.
A. flagellosa V; 8 cm.; white; Jap.; 1.
A. Halleri IV; 20 cm.; light lilac; Al.; 6.
A. Holbœlli V; 20 cm.; lilac; N. Am.; 6.
A. Japonica V; 25 cm.; white; Jap.; 1, 4.
A. Kellereri IV; 25 cm.; white; Ba.; 4.
A. Lemmonii IV; 15 cm.; pink; R. M.; 6.
A. lucida V; 15 cm.; white; E. Eur.; 4. (A var. with variegated leaves.)
A. Nordmanniana V; 25 cm.; white; N. Eur.; 1, 6.
A. ovirensis IV; 20 cm.; light pink; E. Al.; 4, 6.
A. petræa III; 10 cm.; white; W. Eur.; 1, 4.
A. procurens IV; 10 cm.; white; E. Al.; 1, 6.
A. pumila V; 10 cm.; white; S. Eur.; 4, 6.
A. purpurascens IV-V; 10 cm.; lilac; Gr.; 1, 4.
A. rosea IV-V; 15 cm.; pink; Ab. 4, 6.
A. rugocarpa IV; 10 cm.; purple; N. Am.; 4, 6.

A. Scopoliana IV; 15 cm.; white; E. Al.; 1.
A. serpylifolia V; 15 cm.; white; W. Al.; 1.
A. Soyeri V; 15 cm.; white; Py.; 1, 6.
A. Sturyi IV; 8 cm.; white; E. Al.; 4, 6.
A. sulfurea (*Draba Aucheri*) V; 5 cm.; sulphur yellow; Persia; 4.
A. Vochinensis IV; 20 cm.; white; E. Al.; 1, 6.

ARCTOSTAPHYLOS or ARBUTUS. Bearberry. Dwarf shrubs, generally evergreen, with crooked branches, the bark dark red or chocolate colour; leaves thick and leathery, entire, rarely serrate; flowers small urn-shaped, pink or white. In N. W. America I have seen big forests of Arctostaphylos, called Manzanita, 4-5 m. high. All along the Pacific Coast, on both Asiatic and American sides, the Bearberries are represented by shrubs full of grace and beauty. In California there are 25 different kinds of Arctostaphylos growing on the rocks or even in the deserts. In our alpine gardens we grow only the dwarf creeping ones like the *A. Uva-Ursi* (Red Bearberry), a mat-forming bush, with long trailing branches (often 2 metres long), running over the soil and covering large spaces of ground or of rocks. The leaves are thick, leathery, dark green, the flowers small, pink and white (March-April) and the berries are bright red. *A. nevadensis, pumila, nummularia,* and *myrtifolia* are its West American cousins. *A. Uva-Ursi* grows all over Europe and N. America on rocky, sun-exposed places, from the plains or the sea strand to the high alpine zone to 2000 m. altitude and is of easy culture. It wants only a light sandy soil and sun exposure. All can be propagated by cuttings, runners, and seed (slow germinating). *Arctostaphylos alpina* is quite a different plant, with deciduous foliage, pure white flowers, and black, shining berries, which grows in the alpine and arctic regions of Europe and America and must be cultivated according to No. 5, or on the moraine.

ARENARIA, Sandwort, and the ALSINE are very closely related and, from a gardening point of view, are the same. The Alsine have three-valved capsules and thin, narrow leaves, while the Arenaria have 8 to 10-toothed capsules and generally broader leaves. This is of little importance for us, as gardeners, and we unite them. They are dwarf, creeping, or tufted rock plants, with white or pink flowers. They are perennial—at least the great majority—and of easy culture. Seed or division.

A. acerosa VI; 10 cm.; white; Or.; 4.
A. Arduini VII; 15 cm.; white; Ca.; 1.
A. aretioides VI; 2 cm.; white; Ap., Ab.; 4, 6.
A. Armeniaca VI; 15 cm.; white; Or.; 1.
A. armeriastrum VII; 10 cm.; white; Sp.; 4, 6.
A. Balearica VI-X; 2 cm.; white; Co., Baléares; 4, 6.*
A. banatica VI; 15 cm.; white; Cp., E. Al.; 4, 6.
A. Bauhinorum. See *A. liniflora*.
A. Bertoloni VI; 10 cm.; pure white; S. Eur.; 4, 6.
A. biflora VI; 5 cm.; white; Al., Ba.; 6; P.
A. bosniaca VI; 8 cm.; white; Ba.; 4, 6.
A. cæspitosa. See *Sagina*.
A. capillaris VII; 15 cm.; white; B. R.; 6.
A. capitata VI; 3-4 cm.; white; Al., Py., Sp.; 4, 6.

A. cephalotes VII; 20 cm.; white; Or.; 1, 6.
A. cerastiifolia VI; 10 cm.; white; Py., Sp.; 4, 6.
A. Cherleria. See *Cherleria sedoides.*
A. ciliata VI; 5 cm.; white; Al., B. R.; 6.
A. dianthoides VII; 30 cm.; white; Or.; 1', 4.
A. erinacea V; 2 cm.; white; Sp.; 4, 6.
A. Fendleri VI; 15 cm.; cream white; R. M.; 6.
A. festucoides VII; 30 cm.; white; H.; 1', 6.
A. Formosa VII; 30 cm.; white; Si.; 1, 6.
A. frigida VI; 20 cm.; white; Ca.; 4.
A. Gerardi VI; 10 cm.; white; Eur.; 6.
A. gothica VI; 15 cm.; white; B. R.; 4, 6.
A. gracilis VI; 15 cm.; white; E. Al., Or.; 4, 6.
A. graminifolia VI-VIII; 25 cm.; white; Ca.; 1, 6.
A. grandiflora VI-IX; 10 cm.; pure white; Al., J. R., M.; 1, 4, 6.
A. gypsophiloides VII; 25 cm.; white; Or.; 1, 6.
A. hirta VI; 10 cm.; white; Eur.; 1, 6.
A. imbricata VI; 4 cm.; white; Ca.; 4, 6.
A. juniperifolia VI; 15 cm.; white; Or., Tu.; 4, 6.
A. Kashmirica VI; 5 cm.; white; H.; 4, 6.
A. Kingii VIII; 15 cm.; white; R. M.; 4, 6.
A. (*Facchinia*) *lanceolata* VI; 5 cm.; white; Al.; 4, 6.
A. laricifolia VII; 20 cm.; white; Eur., As.; 4, 6; P.
A. lateriflora VI; 25 cm.; white; B. R.; 6.
A. Ledebouriana VII; 25 cm.; white; Or.; 1, 6.
A. liniflora VI; 15 cm.; white; Eur.; 1, 4; L.
A. macrantha VII; 20 cm.; white; R. M.; 1', 4.
A. montana V-IX; 15 cm.; white; Py., Sp.; 1. (A var. *grandiflora.*)
A. mucronata (*rostrata*) VI; 15 cm.; white; R. M.; 4.
A. nardiflora VI; 25 cm.; white; N. Am., Si.; 1.
A. norvegica VI; 8 cm.; white; Sc.; 4, 6.
A. Nuttallii VI; 10 cm.; white; R. M.; 1, 4.
A. parnassica VII; 10 cm.; white; Gr. Or.; 4, 6.
A. (*Honkeneya*) *peploides* VI; 20 cm.; white; Eur., B. R.; 3.

A. pinifolia VII; 15 cm.; white; Or.; 1, 6.
A. pungens VII; 15 cm.; white; Sp.; 4, 6.
A. purpurascens VI; 10 cm.; purple rose; Py., Sp.; 4, 6.
A. recurva VI; 10 cm.; white; Eur., Or.; 4, 6.
A. rigida VII; 20 cm.; white; Or.; 6.
A. Rosani VI; 8 cm.; pure white; Ap., Ab.; 4, 6.
A. rotundifolia VI; 8 cm.; white; Or., Gr.; 4, 6.
A. rupestris VII; 5 cm.; white; Or.; 1, 6.
A. sajanensis VI; 20 cm.; white; As.; 1, 6.
A. Saxifraga VI; 10 cm.; white; Ba.; 4, 6.
A. setacea VII; 20 cm.; white; E. Eur., Or.; 4, 6.
A. Steveniana VII; 15 cm.; white; Or.; 1, 6.
A. stricta VII; 8 cm.; white; Eur., B. R.; 9, 10.
A. tetraquetra V-VII; 5 cm.; white; Py., Sp.; 4, 6.
A. tmolea (*Kotschyana*) VII; 5 cm.; white; Or.; 6.
A. verna VI-IX; 8 cm.; white; Eur., B. R.; 4, 6.
A. Villarsii VI-VII; 1'5 cm.; white; Eur., Or.; 4, 6.

ARETIA. See ANDROSACE.

ARISÆMA. Jack-in-the-Pulpit. Curious Aroids from Japan and N. Am. suited for the bog garden or the moist part of the garden. They like a deep soil and half-shady situation. The leaves are large and handsome and their Arum-like flowers, greenish or purplish, are picturesque. We may mention the following: *A. amurense* from Siberia; *japonicum* from E. Asia; *ringens* from Japan; *speciosum* from the Himalayas; and *triphyllum* from N. Am.

ARISARUM *proboscideum* and *europæum* are some Mediterranean Aroids, very common in the south of Europe on shady slopes, which we grow in our gardens as spring decoration, for their curious flowers.

ARISTOLOCHIA are well known as climbing vines, but there are some very interesting ones belonging to the herbaceous perennials group. They like sheltered position and deep, light soil and are propagated by means of their offsets or from seed.

A. altissima VII; climbing; dark brown; S. Eur., Or.*
A. Clematitis VII; 50 cm.; greenish yellow; S. Eur.; 1 (invading).
A. longa V; 40 cm.; brown; S. Eur.; 4, 6.
A. pallida IV; 30 cm.; brownish; S. Eur.; 4, 6.
A. Pistolochia III; 40 cm.; brownish; S. Eur.; 1, 6.*
A. Pontica IV; 25 cm.; brown; Or.; 1.
A. rotunda V; 50 cm.; yellowish; S. Eur.; 6.

ARMERIA, Thrifts, are generally seashore plants with pink or white flowers forming dense cushions of grasslike leaves, excellent for framing the borders on sunny and dry places. They like light soil, sunny situations, or, in the rockery, deep and well-drained spots. Propagation by division, cuttings, or seed.

A. alpina V-VIII; 25 cm.; bright pink; Al.; 1.
A. arctica VI; 10 cm.; bright pink; B. R.; 6.
A. bella VI; 5 cm.; rose; Magellan Sound; 6.
A. bœtica V; 20 cm.; rose; Sp.; 1, 4.
A. cæspitosa IV-V; 5 cm.; pale rose; Sp.; 4, 6.
A. canescens VII; 15 cm.; rose; Or.; 1.
A. cephalotes VI; 25 cm.; rose (white in var. *alba*); Sp.; 1.
A. filicaulis VI; 20 cm.; rose or white; Py., Sp.; 1.
A. juncea IV-V; 10 cm.; light rose; Co.; 4.
A. labradorica VI; 10 cm.; bright rose; B. R.; 4, 6.
A. latifolia VI; 25 cm.; rose; Sp.; 1, 6.
A. macrocephala VI; 30 cm.; light rose; Sp.; 1.
A. majellensis VI-IX; 20 cm.; rose; Ab.; 1, 4.

A. maritima, Sea Pink, V-X; 15 cm.; rose; Eur.; 1. (A var. *alba.*)
A. mauritanica VII; 20 cm.; rose; At.; 1.
A. pinifolia VI; 20 cm.; rose; Sp.; 1', 6.
A. plantaginea VI-IX; 30 cm.; rose (white in var. *alba*); Eur.; 1.
A. setacea V; 8 cm.; light rose; Sp.; 4, 6.
A. sibirica VI; 20 cm.; pale lilac; Si.; 1, 6.
A. splendens V; 15 cm.; bright rose; Sp.; 4, 6.
A. vulgaris VI-IX; 15 cm.; pale lilac; Eur.; 1.
A. Welwitchii VI; 20 cm.; rose; Sp.; 1. (Numerous garden varieties such as *Laucheana, Six Hills, splendida, Vindictive,* etc.)

ARNEBIA *echioides.* The Prophet-Flower. A splendid Borragewort, forming masses of gay green foliage with 30-40 cm. high stems in April-May, carrying bunches of lemon-yellow blossoms in scorpioid form, with five black spots at the throat, which fade away as the flower grows older. It comes from the Orient and is easily propagated from seed; culture 1 or 6.

ARNICA is a unique Composite with opposite leaves; having yellow flowers like the Marigolds and growing on the pasturages of the high mountains in the Old and in the New Worlds. They are somewhat glandular and aromatic and most medicinal. In the Rockies, from California to the arctic regions of Canada, there are numerous species, while in Europe we have only one, which is certainly the best of all, either for medicine or for the enlightenment of rockeries. The best American species are: *Arnica alpina, amplexicaulis, aspera,* *aurantiaca, Bernardiana, betonicæfolia, Chamissonis, cordifolia, foliosa, fulgens, gracilis, latifolia, longifolia, mollis, nevadensis, parviflora, viscosa.*

A. Sacchalinensis is an East Asiatic plant. But none of these can enter into competition with the orange yellow *Arnica montana,* the wholesome, aromatic Arnica whose good offices in the world of medicine have been known for centuries. That bright sunflower on a 20 cm. high stalk is one of the marvels of our mountains. Its culture is not easy on lime but if planted on peat it succeeds very well. It flowers V-VI and wants culture 6, 9, or 10. It does well in sphagnum and is easy to raise from seed.

ARONICUM is allied to Arnica and to Doronicum. Pure alpines and some (*A. Clusii, A. glaciale*) inhabit the highest zones and are the last big flowers we find on high altitudes. All grow on stony, fresh slopes; we have great trouble with those two kinds, but in England, thanks to the damp atmosphere, they do better. They need some rock fissures and a "fresh" situation.

A. (*Doronicum*) *Scorpioides,* common in alpine regions of Europe, is easier for us. It only wants a rocky, limy soil and half shade. Division or seed.

ARTEMISIA. Wormwood. This is an aromatic and medicinal genus of Composites, whose silver leaves are a good decoration for the rockeries. Some, as the Tarragon (*A. dracunculus*), are bright green and glabrous, and some, as *sacrorum* and *suavis,* are dark green and shrubby. But generally they are silvery tufts of ferny and beautiful foliage, especially in the alpine species; the flowers are greenish or sometimes, as in *A. glacialis,* golden yellow or, as in *A. granatensis,* reddish and have no great charm. They want generally a rocky and sunny situation. Propagated either from layers, division, cuttings, or seed. Those names marked with *Ar.* are aromatic.

A. absinthium 80 cm.; leaves silver white; very bitter; Eur.; 1, 4; M.; Ar.; P.
A. arborescens 1 m.; silver-white fol.; M. R.*
A. atrata 25 cm.; E. Al., Or., Al.; 6. L.
A. austriaca 20 cm.; silver-white fol.; E. Al.; 1, 6 (running).
A. Baumgartneri 20 cm.; silver-white fol.; Ap., Cp.; 6.
A. borealis 30 cm.; silky fol.; R. M.; 6.
A. cærulescens 50 cm.; greenish fol.; S. Eur.; 1.
A. cæspitosa 30 cm.; silver-white fol.; Si.; 1.
A. camphorata 50 cm.; greyish-green fol.; S. Eur.; 1. M.; Ar.
A. canadensis 50 cm.; silver-white fol.; B. R.; 6.
A. caucasica 15 cm.; silver-white fol.; Ca.; 6.
A. chamælelifolia 50 cm.; greenish fol.; W. Al.; 1. Ar.
A. Eriantha (*Villarsii*); silver-white fol.; Al., Py.; 4, 6. Ar.
A. frigida 25 cm.; silky silver-white fol.; R. M.; 1, 4. M.; Ar.
A. gallica 30 cm.; silver-white fol.; S. W. Eur.; 1. Ar.
A. glacialis 20 cm.; silver-white fol.; Al.; 8. M.; Ar.
A. granatensis (*nevadensis*) 15 cm.; silver-white fol.; Sp.; 1, 4. Ar.
A. Hausknechtii 1'0 cm.; silver-white fol.; Tu.; 4.
A. lactiflora 80 cm.; white flowers, green fol.; Ch.; 1.
A. lanata (*pedemontana*) 15 cm.; silver-white fol.; P. Al.; 4, 6.
A. maritima 30 cm.; silver-white fol.; Eur.; 1. Ar.
A. Mutellina (*Genipi*) 10 cm.; silver-white fol.; Al.; 6, 10. M.; Ar.
A. nana; 20 cm.; grey-greenish fol.; S. Al.; 1, 4.

A. nitida 15 cm.; silver-white fol.; Ap.; 4, 6. Ar.
A. pedatifida 20 cm.; downy fol.; R. M.; 4, 6.
A. pontica 40 cm.; grey-green fol.; Eur.; 1. M.; Ar.
A. Roezli 25 cm.; silver-white fol.; Sp.; 6. Ar.
A. rupestris 5 cm.; dark green fol.; Eur., Si.; 4, 6.
A. sericea 25 cm.; silver-white fol.; B. R.; 6.
A. spicata 10 cm.; silver-white fol.; Al.; 8, 10. M.; Ar.
A. splendens 30 cm.; silver-white fol.; Ca., Or.; 1, 6.
A. Stelleriana 25 cm.; downy fol.; As., N. Am.; 1, 6.
A. tridentata (Sage-brush) 60 cm.; downy fol.; W. Am. deserts; 4. Ar.
A. Valesiaca 20 cm.; silver-white fol.; Valesian Al.; 4. P; Ar.

ARUM. Lords and Ladies. These plants are more curious than beautiful but have many friends among alpine gardeners. They all want sheltered places on half-shady underwoods or in the rock garden. Good, rich, and deep soil; propagation from seed (slow germinating) or division. Their leaves and the spathe are the unique ornaments of the plant.

A. italicum III; variegated leaves; S. Eur.; 2.
A. maculatum III; green spathe; Eur.; 2.
A. orientale III; reddish-green spathe; Or.; 1, 2.
A. palæstinum IV; reddish spathe; Or.; 2.

ARUNCUS. See SPIRÆA *Aruncus.*

ASARUM. Wild Ginger or Asarabacca. Curious dwarf and creeping plants belonging to the Aristolochiads; they are edging plants with generally kidney-shaped leaves, often evergreen. Their flowers, coming early, are reddish brown and hidden beneath the foliage; their thick stolons are strongly aromatic and smell like patchouli. Useful plants for very shady places, underwood, borders, rockeries, etc.; they are very hardy and can be propagated by division or from seed (slow germinating).

A. arifolium (*grandiflorum*) 20 cm.; N. Am.; 1, 2.
A. canadense 25 cm.; N. Am.; deciduous leaves; 1, 2.
A. caucasicum 25 cm.; Ca.; 1, 2.
A. caudatum 20 cm.; N. Am.; 2, 6.
A. europæum 20 cm.; Eur., Si.; 1, 2.
A. grandiflorum 25 cm.; N. Am.; 1, 2.
A. Hartwegi 20 cm.; Sierra Nevada, Cal.; 1', 2.
A. Lemmoni 10 cm.; Cal.; 1, 2, 6.
A. Sieboldi 20 cm.; Jap.; 1, 2. (Numerous vars. in Japan.)
A. virginicum 15 cm.; N. Am.; 1, 2.

Asparagus *tenuifolius* from South European mountains has the slenderest foliage one can imagine; flowers greenish and very big berries. It wants a well drained, sheltered place. Division or seed (slow germination).

Asperula, Woodruff, belonging to the Rubiaceæ, includes a large number of species, some of them being very suitable for the rock garden. They are small tufted plants with numerous flowers, some being dwarf cushions, very beautiful when covered with their numerous little stars. Division or seed.

A. arcadiensis V; 5 cm.; light rose; Gr.; 6, 8, 10.
A. athoa. See *A. suberosa.*
A. cynanchica V-IX; 20 cm.; light rose; Eur.; 1, 4, 6, 7.
A. Gussoni V; 10 cm.; rose; Etna; 4, 6.
A. hexaphylla VI; 30 cm.; white; Al., Cp.; 1.
A. hirta VI; 10 cm.; whitish rose; Py.; 1, 4.

A. nitida V-VII; 8 cm.; rose; Gr.; 4, 6.
A. odorata, Sweet Woodruff, IV-V; 20 cm.; white; Eur.; 1, 2. M.; Ar.
A. suberosa, Athoa, V; 5 cm.; light rose; Gr.; 4, 6.
A. Taurina VI; 40 cm.; pure white; S. Eur.; 1, 2.

ASPHODELUS. Asphodel. Big Liliads with grass-like foliage, erect stems bearing the flowers. These plants are South European and grow in masses on dry slopes between the stones on very sunny places. Their roots are fusiform tubercles resembling those of the Dahlias. Propagation by division or from seed (slow germinating). There are some ten or twelve in cultivation, the best known of which are:

A. acaulis VI; 5 cm.; whitish pink; At.; 1.
A. albus VI; 1 m.; whitish pink; S. Eur.; 1.
A. fistulosus VII; 1 m.; light rose; Med.; 1.
A. pyrenaicus VII; 80 cm.; white; Py.; 1'.
A. Villarsii VI; 1 m.; light rose; W. Al.; 1.

ASPHODELINE is nearly allied to the preceding; they have yellow flowers and belong in the East Mediterranean regions. *A. cretica* and *lutea* are grown in gardens.

ASPIDIUM, ASPLENIUM, ATHYRIUM. (See the Fernery, p. 88.)

ASTER. Here is quite a multitude which offers us many plants for the rockery. We do not include here the Michaelmas Daisies, which belong in the herbaceous border, but only those Asters which belong to the mountain world. They are hardy, dwarf tufted plants which can be grown in every healthy soil on well-drained spots and may be divided or grown very easily from seed.

A. acris IX; 40 cm.; deep lilac and yellow; S. Eur.; 1.

A. alpinus V-VII; 25 cm.; purple and yellow; Eur., As., N. Am.; 1. (Numerous forms and local varieties: *albus, andinus, baldensis, caucasicus, himalayicus, roseus, speciosus,* etc.)

A. altaicus VI; 25 cm.; light purple; Si.; 1.

A. Amellus VII-X; 40 cm.; purple and yellow; Eur.; 1. (Numerous garden and local varieties: *albus, amelloides, Bessarabicus, ibericus, roseus,* etc.)

A. brachytrichus VI; 25 cm.; purple; Ch.; 1.

A. campestris VI; 25 cm.; deep blue and gold; R. M.; 1, 6.

A. canescens IX-XI; 40 cm.; lilac and yellow; R. M.; 1.

A. diplostephioides VI; 30 cm.; pale violet with purple disk; H.; 1.

A. Farreri VII; 30 cm.; deep purple; Ch.; 1, 6.

A. Fremonti VII; 20 cm.; light rose; R. M.; 1.

A. Garibaldi VI; 20 cm.; purple and yellow; Ap.; 1.

A. graminifolius VII-X; 20 cm.; white; N. Am.; 1.

A. lichiangensis VI; 10 cm.; purple and gold; Ch.; 1, 6.

A. Patersonni VII; 25 cm.; purple lilac; R. M.; 1.

A. Porteri V-XI; 30 cm.; white; N. Am.; 1.

A. Ptarmicoides VIII; 40 cm.; white; N. Am.; 1.

A. pulchellus VII; 15 cm.; purple and yellow; R. M.; 1.

A. Purdomi VII; 15 cm.; bright lilac and yellow; Ch.; 1.

A. pyrenæus VII; 40 cm.; deep violet; Py.; 1.

A. scapigerus VI; 15 cm.; violet and yellow; Si.; 1.

A. sericeus VIII-IX; 30 cm.; violet; N. Am.; 1.

A. sibiricus IX; 30 cm.; lilac and yellow; Si.; 1.

A. subcæruleus V-IX; 20 cm.; deep lilac and yellow; H.; 1.

A. Yunannensis VI; 30 cm.; clear blue; Y.; 1.

ASTEROLINOSYRIS *Willmottiæ* is a hybrid between *Linosyris* and *Aster acris* of less value.

ASTILBE. The first Astilbe introduced was *A. rivularis* from the Himalayas, with white flowers recalling those of *Spiræa Aruncus;* it flowers in summer, 80 cm. tall stems; suitable for damp places. Then come *Astilbe* (Hotteya) *japonica* and *A. sinensis,* both good things for shady and damp places. Later *Astilbe Thunbergi* from Japan with its spikes of whity-pink flowers. Suddenly appears the most beautiful thing for bog and moist places, *A. Davidii* from China, with elegant pink flowers.

From these different species the nurserymen made numerous hybrids whose names form long columns in the catalogues, pink, crimson, magenta, white, light rose, etc., all good for the bog garden. In big and damp rockeries they can be used for summer decoration and they give great beauty to the garden. The best are: *A. Arendsi, Crépuscule, grandis,* Magenta, Salmon Queen. *A. simplicifolia* from Japan is a small plant with pure white flowers. They all are easily grown from seed and can be propagated by division.

ASTRAGALUS are (some of them) tufted choice Pea-flowers belonging to a very large genus. In the *Flora Orientalis,* Boissier describes 757 different species, for that little part of the world alone! But not more than 20 or 25 species of Astragalus are grown in gardens. They are hardy, robust plants, often dwarf prostrate shrubs, very decorative for the rockery. They cannot be moved easily and are propagated from seed. All like a sunny, rather dry situation, growing generally on stony slopes. Sh. indicates shrubby species.

A. alopecuroides VII; 60 cm.; gold yellow; W. Al., Sp., Si.; 1.
A. alpinus. See *Phaca astragalina.*
A. angustifolius VII; 15 cm.; white; Or.; 1, 6. Sh.
A. aristatus VII; 20 cm.; yellow; Al., Py.; 4, 6 (spiny). Sh.
A. depressus VII; 20 cm.; light yellow; S. Eur.; 1, 6.
A. exscapus VII; 30 cm.; yellow; S. Al., Cp.; 6. P.
A. hypoglottis (*Danicus*) VII; 20 cm.; purple; Eur.; 1, 6.
A. massiliense (*Tragacanthus*) VI-VII; 40 cm.; light azure; S. Eur.; 1, 4. Sh.
A. maximus VII; 1 m.; yellow; Si.; 1.
A. monspessulanus VI; 10 cm.; bright carmine; S. Eur.; 1, 4. Sh.
A. Narbonense VII; 60 cm.; yellow; S. Eur.; 1.
A. Onobrychis VI-VIII; 15 cm.; bright pink; Eur.; 1, 6.
A. purpureus VI; 15 cm.; deep rose; S. Eur.; 6.
A. sanguinolentus VIII; 10 cm.; deep carmine; Or.; 4, 6. Sh.

ASTRANTIA belongs to the uncharming family of Umbellifers, and is one of the rare attractive plants in that large group of plants. The involucre, which constitutes a more or less large and elegant cup sustaining the flower masses, is the ornamental feature; it is whitish, greenish, or reddish and more or less finely cut and divided. They generally like a cool, light, and porous soil and a fresh situation. Propagation by division or seed (slow germinating).

A. bavarica V; 25 cm.; whitish; E. Al.; 6.
A. Biebersteiniana V; 50 cm.; white green; Ca.; 1, 2.
A. carinthiaca IV-V; 40 cm.; whitish; E. Al.; 6.
A. carniolica V; 30 cm.; pure white; E. Al.; 1, 2, 6.
A. caucasica V-VIII; 50 cm.; white green; Ca.; 1, 2.
A. gracilis V; 30 cm.; white rose; E. Al.; 6.
A. helleborifolia VII; 50 cm.; reddish green; Ca.; 1.
A. major VI-X; 60 cm.; reddish green; Eur., Ca.; 1, 2.

A. major rosea with pink involucres.
A. minor VI; 20 cm.; white; Al.; 6, 10. P.
A. neglecta VI; 30 cm.; white green; E. A.; 6.
A. pauciflora VI; 25 cm.; white; Ap.; 6.

ASTROCARPUS *Clusii* (*Reseda sesamoides*) is a nice little Mignonette of the S. W. European mountains, 5-20 cm. high, with small white flowers in clusters.

ATHAMANTHE *cretensis, Matthioli,* and *vestina* are interesting Umbellifers with very thin foliage and white flowers, liking sunny and rocky situations. Seed (slow germinating).

ATRAGENE is a form of Clematis with only four divisions in the calyx; they are good climbers with large, generally purple, flowers and very graceful foliage. Propagated by grafting on Clematis viticella or seed (slow germination).

A. alpina V; 2-3 m.; purple; Eur.; 1-2. (Some varieties: *alba, grandiflora,* and *rosea.*)
A. Coreana VI-IX; 2 m.; yellow; Corea; 1.
A. sibirica V; 2 m.; yellowish; Si.; 1, 2.
A. verticillaris V; 1'-2 m.; deep purple; N. Am.; 1, 2.
A. Wenderothii V; 1-2 m.; purple; Tr.; 1, 2.

ATRAPHAXIS. Small shrubby, tufted, or spreading Polygonads, with pale or bright pink flowers in little bunches; they come from Turkestan and Asiatic deserts and are very hardy to the drought and the sun. Seed and cuttings.

ATROPA *Belladona,* the Belladonna, is well known as a poison, but sometimes it is a decorative plant not for its reddish brown flowers, but for the rich black shining berries (yellow in the var. *lutea*). But it is rather dangerous to grow this plant in a garden where children are admitted, the poisonous fruit being very attractive. It likes shade and a limy soil.

AUBRIETIA. This is a very brilliant and attractive group of carpeting plants. It is not old in our gardens and I remember the time Mr. Edmond Boissier introduced from Greece the *A. deltoidea* in our country, some sixty years ago. In the year 1882 I was asked by a friend at Montreux for a wall plant to introduce on the big rampart sustaining the National Hotel at Territet and I sent him some Aubrietia I had received from Mr. Boissier. Now the whole country there is at springtime quite empurpled by the masses of Aubrietia covering all the walls of the vineyards and of the gardens and even at the roadsides. These plants vary in colours from light purple or even white to dark red, and are ornamental not only for the flower garden and the borders, but especially for walls and rockeries, because they produce thick masses of flowers from the earliest spring till June. They delight in open, dry situations and are multiplied by division, cuttings, and seed. This is one of the rare group of plants whose garden hybrids or varieties are to be preferred for the rock garden.

A. canescens III-V; 5 cm.; lilac; Or.; 1, 4.
A. Columnæ IV; 10 cm.; lilac; S. Eur.; 1, 4.
A. croatica III-V; 5 cm.; purple blue; E. Eur.; 1, 4.

A. deltoidea II-VI; 5-8 cm.; bright purple; S. and E. Eur.; 1, 4.
A. erubescens IV-V; 10 cm.; white; Mt. Athos; 1, 4.
A. Eyrii IV; 8 cm.; light violet; E. Eur.; 1, 4.
A. græca IV; 10 cm.; pale lilac; Gr.; 1, 4.
A. hesperidifolia III-V; 8 cm.; purple; S. Eur.; 1, 4.
A. Kotschyi IV; 10 cm.; pale pink; Gr.; 1.
A. libanotica IV; 10 cm.; lilac; Or.; 1, 4.
A. Olympica IV-V; 10 cm.; deep purple; Gr.; 1, 4.
A. Pinardi IV; 8 cm.; reddish lilac; Or.; 1, 4.
A. purpurea IV-V; 8 cm.; purple; Gr.; 1, 4.
A. tauricola IV-V; 8 cm.; lilac; Or.; 4.

These are the original species; from them we have by crosses or selection quite a collection of beautiful varieties of which the following are the best: *A. Bakeri,* purple; *croatica* fol. var. with variegated leaves; *Dr. Mules,* bright purple; *Fire-King,* with brilliant crimson flowers; *Florariensis,* with crimson flowers; *Frœbeli,* purple; *Hendersoni,* violet reddish, lavender blue; *Lloyd Edwards,* very bright violet large flowers; *Lilac Queen,* bright lilac; *Marshalli,* purple; *Mœrheimi,* soft rose; *Mooreana,* purple; *Paul's Lilac; Pritchardi,* bright lilac; *purpurea,* purple; *Purple King; Richardsoni,* lilac; *rosea grandiflora; Wallacei,* lilac, etc.

AUREOLARIA *glauca.* False-Foxglove. Under this name some American friends brought me seeds of a marvellous yellow flower, which is described in the *Wild Flowers of New York* and illustrated in Plate 202. This is an interesting perennial, with bright yellow Digitalis-like flowers, flowering from July to September.

AZALEA (Loiseleuria) *procumbens.* This is a delightful minute shrub, carpeting the high rocks of our granitic Alps and adorning all these desolate regions with its very thin and thick dark green foliage and with its myriad of little sweet rose flowers. It does not exceed 2 or 3 cm. high and grows in the arctic boreal zones too. It is rather rare in cultivation, as it wants pure peat and porous soil, mixed with sphagnum and a well-drained spot in the rock garden. It likes sun, but we have to shade it in the summer days. Seed or cuttings.

AZORELLA. Umbelliferous plants with small leaves, looking like some Saxifrages of the decipiens group and very creeping. The flowers are nothing, but the bright green foliage is nice.

BALLOTA *spinosa* (*Molucella fruticosa*), is a very curious and picturesque spiny shrub, half climbing, belonging to the Horehound family and growing on half-shady places of the Southern Alps; white, unshowy woolly flowers all the summer through. Is useful to give life to barren slopes. Seed or cuttings.

BANFFIA *petræa*. See GYPSOPHILA *transylvanica*.

BAPTISIA *australis* is a perennial Lupine with blue flowers from N. Am.; 80 cm. to 1 m. high, very glabrous and flowers from June to August. Deep soil, half shade or sun; propagation by division or seed.

BARBAREA *rupicola* is a delicious dwarf and stemless Cabbage or Winter-Cress, growing in Corsica, with bright yellow flowers on a bright green foliage. It wants a spot in the rockery or a fissure on the south exposure of a wall but it likes good deep soil. It seeds freely and reproduces itself.

Bartsia *alpina,* from the cold and boreal regions of the Northern Hemisphere, is a half-parasite plant of the Scrophulariæ nearly related to Pedicularis, which is not easy to grow in gardens. Prof. Heinrich, of the botanical garden at Innsbruck, who was a specialist in parasite culture, grew it well in a kind of marsh (the so-called moraine of gardens) with some grasses as supporters.

Bellidiastrum *Michelii,* Aster Bellidiastrum, is a giant Daisy of moist places and banks growing in the subalpine regions of South Europe; fine white flowers on 30 cm. high stem and luxurious green, shining leaves; V-IX; culture 1, 2, or 3. Division or seed.

Bellis. Daisy. Well known and grown for centuries indeed, *Bellis perennis* is useful to bedeck the grass of lawn and meadow. The double varieties are not to be recommended for the rockery and should be confined to borders and flower beds. Some of its cousins, however, are good for us: *B. mexicana* of the Mexican mountains and *B. sylvestris* of South Europe, both being large forms of *perennis,* with pink flowers. *Bellis rotundifolia* from Mt. Atlas and Corsica, and particularly its blue variety *B. cærulescens* with pale blue flowers, are some of the best plants for sunny places in the rockery. Seed.

Bellium *bellioides* from S. Eur. and its congener *B. crassifolia* from Corsica are two very minute plants, seemingly miniatures of the common Daisy, with white flowers, brownish red below, and flat leaves; they succeed on sunny, well-drained places on a wall or on the rockery and like light sandy soil. They reproduce themselves from seed in our gardens.

BERARDIA *subacaulis*. I was happy indeed the first time I found this Composite on the Col d'Isoard (Hautes-Alpes); a very curious, strange plant, with large, round, fat, and villose leaves; the flowers are rather ugly, stemless, woolly, yellowish heads. The plant is rare and only grows on barren limestone slopes where nothing else is to be seen except, perhaps here and there, *Valeriana Saliunca*. On the Col de Boules (Basses-Alpes) it is framed with myriads of *Geranium argenteum* and this is an exquisite beauty. We have had great trouble with it and only succeeded within the last three years in growing it on the top of a tufa wall in very poor soil.

BERGENIA. See SAXIFRAGA.

BERKLEYA. See STOBÆA.

BETONICA. Betony. Handsome Labiates, near to the Sages, of very easy culture; sun; seed or division.

B. Alopecuros VI-VIII; 40 cm.; lemon yellow; S. Eur.; 1.
B. grandiflora VII-IX; 40 cm.; bright purple; Ca.; 1. (A variety *superba* has bigger and brighter flowers.)
B. hirsuta, VII; 30 cm.; purple red; S. Eur.; 1.
B. nivea VII; 40 cm.; white; Ca.; 1.
B. officinalis VII; 30 cm.; reddish purple; Eur.; 1. M.

BETULA *nana* is the sweetest little shrub imaginable. It is an arctic plant and we have it on our Swiss Jura in two stations which are the sacred remainders of the glacier periods in our country. The dwarf Birch is not higher than 50-80 cm., has long straightish sprays and small, bright green and shining, round, nicely scalloped leaves. It likes a spongy soil and an open situation and is beautiful on a rockery. Propagation from seed, cuttings, or layers.

BIDENS *dahlioides,* from the Mexican mountains, is near Cosmos but a perennial, generally not exceeding 50 cm. in height; flowers are dark brown in the type and abound from June to October. Good soil, sheltered situation on a sunny place. Seed.

BIEBERSTEINIA *Orphanides,* from Greece and Asia Minor, is a very curious Geraniaca which formerly we grew at Floraire easily on a very sunny, well-drained bed at the foot of a wall; we lost it, however, and for more than twenty years, now, I have been asking for it among my friends, but without result. It resembles *Erodium daucoides,* with a big tuberous root, finely cut leaves and rose-pink flowers in a dense cluster. Seed.

BLETIA or BLETILLA. See under HARDY ORCHIDS.

BOUGARDIA *Rauwolfii* is a Berberid, cousin of the curious Leontice and belongs in the Oriental flora, with a big tubercle, finely feathered basal leaves, bright yellow hanging flowers on a naked stem, 20 cm. high. It flowers in June-July, wants a well drained, light, and sandy soil in a sheltered corner. Seed (slow germinating).

BORAGO. The Borages are well known as annual plants with the brightest azure flowers. There are some perennial species, however, admissible to the alpine garden: *B.* (*Psilostemon*) *orientale,* a coarse, big plant flowering in the first days of February, often in January, with pink and azure flowers forming large panicles much visited by the bees. The *B. laxiflora* is a beauty from Corsica growing there in shady and moist places near the fountains; the delicate azure and pink flowers recall those of *Omphalodes Luciliæ* but the leaves are rough and bristly. It flowers here, on the north side of our wall, from March till late autumn and is easily raised from seed. A *Borago Trabuti* has been lately described by Maire of Morocco and sent to me. It is a beautiful form of *B. officinalis* with very elegantly cut flowers of the heavenliest blue.

BOYKINIA is near Saxifraga and belongs to N. America. The plants form masses of handsome foliage and have cream-white flowers; they are good for cool, damp, and shaded places. We grow *B. aconitifolia* (*Saxifraga aconitifolia*), 30 cm.; *major,* 50 cm.; *occidentalis,* 30 cm.; and *rotundifolia,* 40 cm. All give plenty of seeds, and are easy to raise.

BRASSICA, Alpine Cabbage, offers us two very different kinds for rockeries: *B.* (*Diplotaxis*) *repanda,* dwarf plant with golden yellow flowers growing on the barren slopes of Dauphiné, Piedmont, and Maritime Alps; and *B. Richeri,* bigger (50 cm. high), with glaucous leaves and large, bright yellow flowers in large panicles. Both demand a sunny place and light soil, and are easily raised from seed.

BRAYA, small Crucifers of the highest alpine regions with white flowers disposed in terminal bunches. *B. alpina* from the E. Al., and *B. pinnatifida* from the highest zones of the alpine chain. They like a fresh situation and peat. Seed.

BRUCKENTHALIA *spiculifolia* is a graceful Heath (15-20 cm. high) of the E. Al. and Balkans with small pink flowers in erect spikes coming out in summer. They like a peaty, acid soil and half sun.

BRUNELLA. See PRUNELLA.

BRYANTHUS. See MENZIESIA.

BULBINELLA (CHRYSOBACTRON) *Hookeri.* A yellow liliaceous plant from the boggy parts of New Zealand; is not quite hardy with us.

BULBOCODIUM *vernum* is an early spring flowering Colchicum, common in some damp meadows of South Eur., with magenta-lilac flowers peering up through the bare earth in long ragged cups round the patches of melting snow just like Colchicum; the leaves appear one or two months after the flowers. There is a bigger form of it flowering a fortnight later, found three years ago in the Valais, which I call *latifolium.* From the Orient we have the *B. ruthenicum* with rose flowers and *soboliferum* with bright lilac flowers. Seed (slow germinating).

BUPHTALMUM *grandiflorum* and *B. salicifolium* are two yellow-flowering Composites growing on barren and rather damp slopes in South Eur.; the flowers are Arnica-like and bright yellow. For *B. speciosum* and *speciosissimum* see TELEKIA.

BUPLEURUM. This is a remarkable genus of Umbellifers with the star-formed bracts of the flowers in shades of greeny or brownish yellow. They succeed in any good soil and want sun. Propagation only from seed (slow germinating). In the S. W. of France, on the Pyrenees, and in Spain there is a remarkable shrub called *B. fruticosum,* reaching to 1-2 m. high, with noble evergreen foliage which is decorative for big rockeries. *B. aureum* (Si.); *Candollei* (H.); *falcatum* (Eur. As.); *graminifolium* (E. Eur.); *longifolium* (Eur.); *Olympicum* (Or.) have yellow or yellowish bracts; *B. stellatum,* a noble child of the limestone mountains in S. Eur., has them pale green and very large; *B. ranunculoides, Baldense* have the bracts greenish and the flowers reddish brown.

BUTOMUS *umbellatus,* Flowering Rush, is a beauty for the bog or water garden with its pink flowers presented in June in loose umbels on 50 cm. high stems. It likes the margin of a river or the bog and is of easy division. Seed.

CACCINIA *glauca, Rauwolfi,* and *strigosa* are some Oriental and Persian Borages, with bristly, fat, big, and more or less glaucous foliage, very rough and long stems running over the soil, with light panicles of violet-rose and blue flowers, from June to October. They are strong plants for sunny rocks or borders, but they cover rather a large space. Easily raised from seed.

CACHRYS *alpina* from the Taurus and *lævigata* from the S. W. of Europe are two rare and beautiful Umbellifers seldom met in gardens. The leaves are very thin, finely cut, the stems 1-2 m. high, divided into numerous branchlets bearing bright yellow flowers from July to September. These plants can be recommended for very sunny, exposed places; they like a deep ground and the driest positions. Seed (slow germinating).

CALAMINTHA. Calamint. Strong, aromatic Labiates with purple and carmine flowers; they grow without difficulty in sandy loam and are increased by suckers or seed.

C. Acynos VII-IX; 25 cm.; pinkish purple; Eur.; 1.
C. alpina VII; 20 cm.; violet; Eur.; 1.
C. grandiflora VII-X; 30 cm.; deep carmine; S. Eur.; 1, 2.

CALANDRINIA. A North American genus of the Portulaca with generally bright carmine or pink, showy flowers; growing well in sandy loam, very sunny; can be multiplied by seed or cuttings. The only one which is really hardy with us (in a sheltered, well drained, and sunny, exposed spot) is *C. umbellata,* 10-15 cm. high, with very deep magenta-coloured flowers (VII-IX).

CALCEOLARIA. South American plants, some being long grown in greenhouses. Only a few can be recommended for the rock garden: *C. Plantaginea* from Magellan, with bright yellow flowers; *polyrrhiza* from Patagonia with yellow flowers; and the shrubby lilac-flowered *C. violacea* from the

Southern Andes. They all want a sheltered position with us and a good porous, well-drained soil. Cuttings, suckers, or seed.

CALLA *palustris* is our European Arum Lily, creeping over the soil and developing large tufts of thick stolons which bear, from May to July, big white spathes, smaller than the Cape Arum Lily but big relatively to the mass of the leaves. Bog garden. Propagation by division or seed.

CALLIANTHEMUM. See RANUNCULUS.

CALLIXENE. See LUZURIAGA.

CALLUNA (ERICA) *vulgaris* is the common Heath of the Northern Hemisphere requiring a pure acid or peaty soil and a sunny situation. There are a great many natural and garden varieties.

CALTHA. Marsh-Marigold or Water-Buttercup. A genus of bright flowers of great help to the alpine gardener; all need a bog or a porous, moist, even damp soil, and some succeed even in the water. Division or seed (slow germination).

C. alpestris, alpine big-flowered form of *palustris.*
C. biflora V; 20 cm.; white; N. Am.; 1, 3.
C. dionæfolia V.; 25 cm.; pale yellow; Terra del Fuego; 1, 3.
C. leptosepala V; 30 cm.; whitish yellow; N. Am.; 1, 3.
C. palustris III-V; 30 cm.; rich orange yellow; N. Hemisphere; 1, 3. (There is a gorgeous var. *fl. pleno,* deep yellow.)
C. parnassifolia IV; 25 cm.; yellow; N. Am.; 1, 3.
C. polypetala V-IX; 80 cm.; light yellow; Or.; 1, 2.

CALYPSO. See TERRESTRIAL ORCHIDS.

CALYSTEGIA. See CONVOLVULUS.

Camassia. Camas-flower. Liliaceæ; they are the blue St. Bruno Lily of N. W. American fields. From the railway running from Oregon to California one sees large stretches of meadows adorned by the sky-blue flowers of Camassia; they grow in the same manner and have the same general aspect as our Paradisia (St. Bruno Lily). The catalogues give four different Camassias bearing more or less blue, more or less big flowers, all being good for the meadow, the rockery, or the border. These are *C. Cusickii,* light blue; *esculenta,* dark blue; *Fraseri,* azure blue; and *Leichtlini* blue, or white in the *alba* variety. They grow in every healthy soil and fear only excessive moisture. Seed (slow germinating).

Campanula. The Bellflowers are well-known garden plants; some are big perennials for the border or the wild garden,.while others scarcely rise more than a few centimetres from the ground; some are annuals or biennials; some are meadow or woodland plants, others are strictly saxatile. They have the advantage of flowering late and giving blooms in the summertime. The big kinds are of easy culture, but some of the saxatile ones need special care. They can be increased from suckers, cuttings, or seed.

C. abietina V; 40 cm.; purple; Tr.; 6, 8. Biennial.

C. acutangula (*arvatica*) V-VI; 5 cm.; rich lilac; Sp.; 4, 8, 10. L.

C. adsurgens VI-VII; 8 cm.; pale blue; Sp.; 4, 6.

C. alliariæfolia VI-XI; 60 cm.; white; Ca., Or.; 1'.

C. Allionii (*alpestris*) V; 10 cm.; lilac purple; S. W. Al.; 4, 6, 8.
C. alpina V-VII; 8 cm.; deep purple; E. Al.; 6, 7, 8.
C. ardonensis VI-VII; 15 cm.; deep violet; Ca.; 4, 6.
C. Aucheri (*argunensis*) V-VI; 10 cm.; rich violet; Ca.; 4, 8.
C. barbata V-VI; 25 cm.; light blue; Eur.; 1, 7. M. (A var. *alba* has pure white flowers.)
C. Baumgartneri is a multiflowered form of *rotundifolia.*
C. Beauverdiana VII; 30 cm.; purple; Ca.; 1, 6.
C. Bellardii. See *C. pusilla.*
C. bellidifolia VI-VII; 10 cm.; rich violet; Ca.; 6, 8.
C. betulæfolia VI; 25 cm.; purple; Or.; 4, 6.
C. Bocconi is a pure white flowering *C. pusilla.*
C. bononiensis VI-VIII; 80 cm.; lilac; S. Eur.; 1.
C. cæspitosa V-IX; 8 cm.; lilac blue; E. Al.; 4, 6. L.
C. calcicola VI; 12 cm.; lilac (leaves white striated); 4. L.
C. carnica V; 15 cm.; lilac blue; E. Al.; 4, 6.
C. carpathica VI-X; 20 cm.; lilac blue; Cp.; 1. (Vars. *alba, compacta, grandiflora, nana, pallida, Riverslea,* etc.)
C. caucasica VII; 30 cm.; light violet; Ca.; 1, 6.
C. cenisia VI; 5 cm.; light blue; Al.; 4, 9, 10. L.
C. cochlearifolia VI; 15 cm.; purple; Ap.; 1, 6.
C. collina VI-VII; 25 cm.; deep purple; Ca.; 1.
C. crispa VIII; 50 cm.; purplish lilac; Or.; 1, 4.
C. cristalocalyx VII-IX; 80 cm.; violet; Ca.; 1.
C. cymbalaria VI; 15 cm.; lilac blue; Or.; 4.
C. dahurica is a big glomerata with darker flowers.
C. dasicarpa V; 10 cm.; deep blue; E. Al.; 6.
C. divergens. See *C. sibirica.*
C. Elatines VIII-X; 10 cm.; deep blue; Ped. Al.; 4, 8, 10. P.
C. elatinoides VI-VIII; 25 cm.; blue; It. Al., Ap.; 4, 8, 10. L.
C. ephesia VI; 30 cm.; lilac; Or.; 4, 8.
C. eriocarpa VI-IX; 1 m.; dark purple; Ca.; 1.
C. excisa VI; 8 cm.; blue lilac; Central Al.; 4, 10. P.
C. fenestrellata VI-IX; 10 cm.; purple; E. Al.; 4, 6.
C. Fergusoni is a hybrid between *pyramidalis* and *carpathica.*

C. fragilis VI-X; 15 cm.; purple blue; Ab., South It.; 4, 6.*

C. garganica VI-VII; 8 cm.; lilac blue; It.; 4, 6. (Vars. *albiflora, grandiflora,* and *hirsuta.*)

C. glomerata VI; 30 cm.; deep purple; Eur.; 1, 7. (Vars. *acaulis, alba, grandiflora, nana.*)

C. grandiflora. See *Platycodon.*

C. Grossekii VII; 60 cm.; lilac; E. Eur.; 1.

C. Haylodgensis hybrid, *pusilla* x *isophylla.*

C. Hendersonii; hybrid, *carpathica* x *pyramidalis.*

C. Hercegovina VI-IX; 20 cm.; lilac blue; E. Eur.; 1, 4.

C. hispanica VI; 30 cm.; light lilac; Sp.; 4, 6.

C. Hostii VI; 15 cm.; purple; Tr.; 1, 4, 7.

C. hypopolia VI; 10 cm.; light purple; Ca.; 4, 6, 10.

C. imeritina V; 10 cm.; lilac purple; Ca.; 4, 6.

C. isophylla VI-IX; 25 cm.; lilac blue; It.; 4.* (A var. *alba* with pure white flowers.*)

C. istriaca; a hairy var. of *garganica* with bigger flowers.

C. Jaubertiana VII; 30 cm.; purple; Sp.; 4, 6.

C. Kewensis; a hybrid, *excisa* x *acutangula.*

C. Kolenatiana VII; 40 cm.; purple; Ca.; 1.

C. lactiflora (*celtidifol.*) VII; 50 cm.; white and azure; Ca.; 1.

C. lamiifolia. See *Alliariæfolia.*

C. lanata (*Velutina*) VII; 20 cm.; light yellow; Ba.; 4.

C. lapponica; a boreal var. of *rotundifolia.*

C. lasiocarpa VII; 15 cm.; blue; N. Am.; 4, 10.

C. latifolia VII-IX; 80 cm.; rich lilac blue; Eur., As.; 1, 2. (Numerous vars., especially the splendid pure white *alba.*)

C. latiloba (*grandis*) VII; 80 cm.; blue or white; Or.; 1.

C. Leutweinii (*incurva*) VII; 30 cm.; pale blue; Gr.; 4. Biennial.

C. linifolia VI-IX; 25 cm.; lilac blue; S. Eur.; 4, 6.

C. longistyla VII; 30 cm.; deep blue; Or.; 1.

C. macrantha; a large flowered var. of *latifolia.*

C. macrorhiza VI-X; 10 cm.; lilac blue; S. Eur.; 4, 8.

C. Marchesetti; a form of *rotundifolia.*

C. Mayi form of *isophylla.*

C. medium VI-VIII; 80 cm.; blue, white, or pink; S. Eur.; 1, 4. Biennial.

C. Michauxioides VIII-IX; 1 m.; blue; Or.; 1. Biennial.

C. mirabilis VII-IX; 25 cm.; pale blue; Ca.; 4, 8.

C. mollis VIII; 20 cm.; pale lilac; E. Eur.; 4, 10. L.

C. Morettiana V-VII; 5 cm.; deep blue; 4, 10. L.

C. muralis (*Portenschlagiana*) VI-IX; 10 cm.; purple; E. Eur.; 4.

C. nobilis VI-VIII; 30 cm.; light blue; Ch., Jap.; 1.

C. Olympica VII; 40 cm.; purple violet; Gr.; 1. Biennial.

C. orbelica VII-VIII; 20 cm.; deep purple; Ba.; 1, 4. L.

C. Parryi VII; 25 cm.; lilac blue; N. Am.; 1, 6.

C. patula VI-IX; 60 cm.; lilac; Eur.; 1, 7. Biennial.

C. pelviformis VII-VIII; 15 cm.; pale lilac; Or.; 1, 4, 6.

C. perricifolia V-VII; 40 cm.; bright lilac blue; Eur.; 1. (Numerous vars. *alba, grandiflora, fl. pl., Mochreimi,* etc.)

C. petræa VII; 20 cm.; yellow; S. Al.; 4, 6.

C. petrophila VII-IX; 30 cm.; pale blue; Ca.; 6, 8.

C. physidocalyx VI; 60 cm.; purple; Ca., Or.; 1, 4, 6.

C. pilosa (*Pallasiana*) V; 15 cm.; blue; Si.; 4.

C. Piperi VI; 5 cm.; lilac blue; N. Am. (Olympic Mountains); 4.

C. planiflora (*nitida*); VI; 25 cm.; lilac; N. Am.; 1, 6.

C. Portenschlagiana. See *Muralis.*

C. primulæfolia VII; 60 cm.; lilac blue; Portugal; 1.*

C. pulla VII; 10 cm.; dark purple; E. Al.; 1, 6.

C. pulloides; a hybrid, *pulla x turbinata.*

C. punctata VII; 30 cm.; whitish lilac; Ch., Jap.; 1.

C. pusilla (*Bellardi*) VI-IX; 10 cm.; lilac blue; Eur.; 1, 4. (A form *alba* has an exquisite pure white bellflower.)

C. pyramidalis VII-XI; 1 m.; light blue or white; S. Eur.; 1, 4.

C. radicosa VII; 5 cm.; deep lilac; Gr.; 4.

C. Raineri VII; 8 cm.; bright purple; It. Al.; 4.

C. rapunculoides VI-IX; 60 cm.; violet; Eur.; 1 (invading).

C. Rapunculus VII; 40 cm.; lilac; Eur.; 1. Biennial.

C. rhomboidalis VII-IX; 40 cm.; bright purple; Eur.; 1, 7. (A good var. *alba.*)

C. rotundifolia VI-X; 20 cm.; lilac; Eur., As., N. Am.; 1, 4, 7. (Vars. *alba, lilacina, fl. pleno, soldanellæflora,* etc.)

C. rupestris. See *C. tomentosa.*

C. sarmatica VII-IX; 40 cm.; dark lilac; Ca.; 1, 7.

C. saxatilis VI-VIII; 10 cm.; bright purple; Crete; 4.

C. saxifraga V; 10 cm.; bright violet; Ca.; 4, 6.

C. Scheuchzeri V-VII; 15 cm.; deep purple; Al.; 6. (Good vars. *alba* and *pallida.*)

C. sibirica (*divergens*) VII-IX; 30 cm.; violet; Eur., As.; 1.

C. speciosa VI-VIII; 25 cm.; bright lilac blue; Py., Sp.; 1, 4.

C. spicata VII; 30 cm.; lilac; S. Eur.; 1. Biennial.

C. Spruneri VII; 40 cm.; blue; Gr.; 1.

C. Stansfieldi; a hybrid, *pulla* x *Waldsteiniana.*

C. stenocodon V-VIII; 10 cm.; dark purple; Ped., Al., Tr.; 4, 6.

C. Steveni VI; 20 cm.; bright violet; Ca.; 1, 6.

C. subpyrenaica VII-VIII; 50 cm.; light purple; Sp.; 1.

C. Tenorii VII; 15 cm.; lilac blue; Ap.; 4, 6.

C. thyrsoideæ VI-VIII; 30 cm.; pale yellow; Eur.; 1, 4. L.

C. tomentosa (*rupestris*) VII-IX; 30 cm.; blue; Gr.; 4. Biennial.

C. Tommasiniana VII-VIII; 10 cm.; pale blue; Istrie; 4.

C. Trachelium VII-IX; 40 cm.; lilac blue; Eur.; 1. (Vars. *alba, fl. pl.* and *grandiflora.*)

C. Transylvanica VII; 25 cm.; lilac blue; Tr.; 1, 6.

C. tridentata VI-IX; 15 cm.; deep blue; Ca., Or.; 4, 6.

C. turbinata VII; 25 cm.; purple; Tr.; 1, 6.

C. tyroliensis VI-VIII; 10 cm.; lilac blue; E. Al.; 4, 6.

C. uniflora VI; 8 cm.; deep blue; Sc.; 4, 6, 10.

C. urticæfolia var. of *Trachelium* with deeply cut leaves.

C. Valdensis VI-IX; 20 cm.; lilac blue; S. Al.; 1, 4.

C. velutina. See *lanata.*

C. versicolor VII-IX; 80 cm.; lilac; Or.; 1, 4, 6.

C. Waldsteiniana VII; 15 cm.; blue lilac; Tr.; 4, 6, 8.

C. (*symphiandra*) *Wanneri* VI-VII; 20 cm.; bright purple; Tr., Ba.; 4, 6.

C. Wilsoni (G. F. Wilson) VII; 15 cm.; deep purple; 1, 6. (Hybrid.)

C. Zoysii VI; 5 cm.; light blue; S. E. Al.; 4, 6, 8, 10.

CARDAMINE. Bitter-Cress. Plants of easy culture, liking an open situation, half shade, and are propagated by division or seed. The *C. alpina* and *resedifolia* of the high Alps are modest little plants with white flowers hardly perennial if not biennial; *C. asarifolia* of the Southern Alps, *chenopodifolia* of Magellan, *glauca* of Italy, and *Olympica* of Greece have large flowers, white, and want rather moist soil; *C. latifolia* of the Pyrenees and S. Alps, *macrophylla* of Siberia and *pratensis* of European fresh meadows and its var. *fl. pl.* have lilac or purple flowers; while the delicious little *C. trifolia* of the woods of S. E. Alps is dwarf and has pure white flowers.

CARDUNCELLUS *monspeliensis* and *mitissimus* are two very lovely dwarf Thistle-like perennials which haunt the barren rocks of the Mediterranean regions. They are almost stemless and make rosettes of leathery spinescent foliage, amid which sits an azure blue head of flowers. In their natural state these beauties are one of the pearls of Provence and Italy. We grow them easily in the crevices of our sunny walls or on a dry and sunny spot of the rockery. Seed.

CARDUUS. Few people, the Scotsmen excepted, like to have Thistles in their gardens. Some species, however, may well be admitted in modest proportion; they generally want a deep, light soil and sun. Seed. (See Cirsium for other Thistles.)

C. acanthoides VII; 60 cm.; carmine rose; Eur.; 1.
C. defloratus VII; 60 cm.; bright carmine; Eur.; 1.
C. Enosmus VII; 1·5 cm.; yellow; Ch.; 1.
C nutans VIII; 80 cm.; bright carmine; Eur., As.; 1.
C. Personata VII; 1 m.; carmine; Eur.; 1.

Carex. Sedge. Belongs to an extensive genus of sandy or marshy grasses. The flowers have generally no attraction, but two of them are exceptions: *C. Baldensis* of South Europe and *Fraseri* of the United States of America, which have pure white flower clusters, the second presenting the largest and broadest leaves of the genus (dark green and shining). *C. Buchanani* from New Zealand has reddish-brown foliage and *C. Gravi* has very curious hedgehog-like fruits. All these Sedges are for marshes or damp places. *C. alba,* from the dry woods of Europe, is a dwarf, tufted, light green plant with white flowers which grows on the driest places and is suited for the dry and barren underwoods where no other plants would grow. *Carex japonica variegata* (*C. Morrowi*) is a fine-looking variegated grass which withstands drought as well as moisture. Seed or division.

Carlina *acaulis,* Silver Thistle, is that low, everlasting, white, and shining big-flowered Thistle which grows all about the mountains of South Europe, well known to every traveller in our country in autumn, as the women use it for a hat ornament.

It thrives in a deep light soil, especially in limestone, and in very sunny situations. Its two cousins, *C. acanthifolia* from the Provençal mountains and *C. Cynara* from the Pyrenees and Spanish Sierras, are much bigger and quite stemless; both have large flowers, on the ground, with the largest heads of all the European plants, some 20 cm. in diameter; the first named has silver-white shining ligules, while the second is yellowish. Both die when they have flowered. Their leaves are of themselves a noble decoration, being silvery Acanthus-like in appearance. They want a very deep, poor, and stony soil, granitic for *acanthifolia,* calcareous for *Cynara,* and a very sunny position. All three are raised very easily from seed.

CASSANDRA (Andromeda) *calyculata* is a dwarf arctic bush 25-30 cm. high with bent branchlets bearing hard greyish leaves and small white bells hanging on the lower part of the shoots. Pure peat; good for the bog or acid-soil garden.

CASSIOPE. A group of small and delicate Heaths belonging to the arctic zones and flowering in the form of Lily-of-the-Valley. They are acid-liking, and can only be grown in peat. *C. tetragona* is the best known in gardens; it is a curious four-square, erect, 10-15 cm. column, bearing all summer through numerous wax-white little bell-shaped flowers. In *C. ericoides,* an arctic Russian cousin, the foliage is thinner and more Heath-like and the white flowers have only three lobes to the bell. In *C. hypnoides,* a Norwegian type, which is still more minute, the flowers are larger. All these tiny beauties are of difficult growth with us on lime soil, but are commonly seen in English gardens, as well as the other Cassiopes: *fastigiata, Mertensiana, Redowskyi,* and *Stelleriana.* Cuttings, division, or seed.

CASTILLEYA. Indian Paintbrush. One of the marvels of N. W. America. I could not resist the desire to see these at close range, and I very often asked my driver to stop in order to admire. These plants are Scrophulariads close to the semi-parasite Pedicularis and I never succeeded in their complete acclimatisation. The most brilliant of them is *miniata* whose scarlet flowers inflame the country all about California.

CATANANCHE *cærulea.* Cupid's Dart. One of the glories of the South; it is a Composite near to Centaurea with greyish, grass-like foliage, large sky-blue flowers with, outside, scarious scales and a dark blue eye at the centre. They form one of the best decorations of the stony slopes in the mountains of the south of France, flowering from May to October. Light deep soil, very sunny and dry position; easily grown from seed.

CATHCARTHIA *villosa.* A small Poppy from the Himalayas, with very hairy dark brown foliage and small yellow flowers on 40 cm. high stems. Culture, 3, 8, or 10. Seed.

CAULOPHYLLUM *thalictroides.* A North American Berberid with three-lobed foliage and small greenish-purple flowers on 30 cm. high stems. Culture 2.

Celmisia, alas, is not for our Continental gardens; they are big antarctic Daisies, some being very beautiful; I have seen their glorious flowers in the south of Europe, in many gardens in England, and on the Pacific Coast of America. *C. coriacea, holosericea, Lindsayi, Lyalli, Mackaui, spectabilis,* and *Traversi* are mostly cultivated. They all like a sunny and sheltered position. Seed.

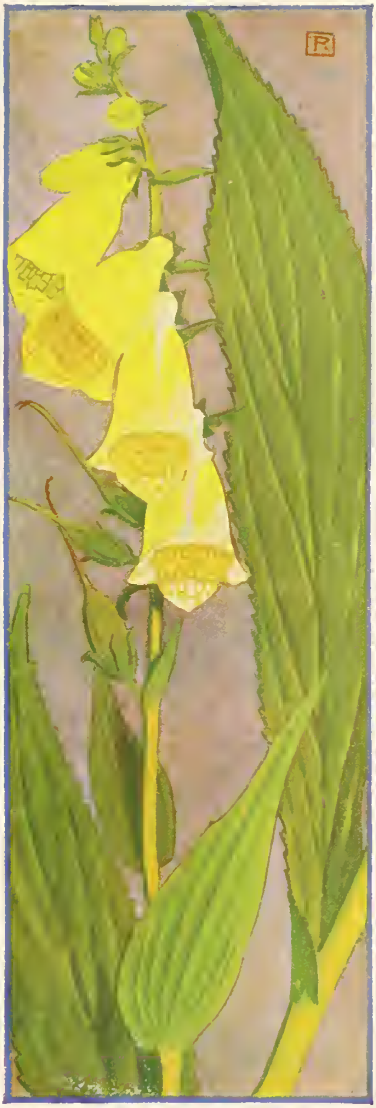
Celsia. Oriental Mulleins, some of which are ornamental plants. They are generally biennials, but some perennial kinds are grown: *C. acaulis,* from Greece, which is a nice dwarf plant having the appearance of *Erodium cicutarium* with nice yellow flowers on very short stems. *C. bugulifolia* (*Ianthe bugulifolia*) from Thrace and Bithynia, is a very nice little Mullein with large and thick leaves and stems 30 cm. high bearing the most curiously coloured flowers one may imagine; the corolla is well open and large, the colour is a metallic bronze yellowish bluish purple, changing like a chameleon. Both want sun and are propagated from seed.

Centaurea. Hardheart or Cornflower. The genus is very extensive and offers some annual, biennial, and perennial plants. Few are really alpines but many are good for big rockeries, borders, wild gardens, etc. They generally want a deep soil and are strong and rugged things. Division or seed.

C. alpina VII-IX; 1 m.; light yellow; S. Al.; 1.
C. atropurpurea VI; 60 cm.; dark carmine; E. Al.; 1.
C. axillaris VI; 40 cm.; blue; S. Eur.; 1.

C. Babylonica VII-X; 2-3 m.; bright yellow; Or.; 1.
C. bella VIII; 25 cm.; pink; Ca.; 1.
C. Bourgæi VI; 5 cm.; pale yellow; Or.; 4, 6.
C. dealbata VII-X; 80 cm.; light pink; Ca.; 1.
C. Lugdunensis VI; 40 cm.; dark blue; W. Al.; 1.
C. macrocephala VII; 60 cm.; bright yellow; Or.; 1.
C. montana V-IX; 30 cm.; dark blue; Eur.; 1. (Varieties *alba, ochroleuca, rosea, rubra.*)
C. nervosa VI; 40 cm.; light pink; S. Eur.; 1.
C. orientalis VI-VIII; 40 cm.; bright yellow; Or.; 1.
C. præalta VI-X; 1 m.; dark carmine; Or.; 1.
C. ruthenica VII; 1 m.; sulphur yellow; Or.; 1.
C. rutifolia VI; 25 cm.; carmine rose; Or.; 1.
C. uniflora VII; 15 cm.; bright rose; S. and W. Am.; 6.

CENTRANTHUS. Wall or Red Valerian. Vigorous, rigid, South European wall plants with thick roots and stems, the flowers pink, red, or white being assembled in very ornamental dense clusters. They are the best resource for the decoration of big walls, stony and arid slopes, or big rockeries exposed to the sun. The pink *C. ruber* with its varieties *atrorubens* (bright red flowers) and *albus* (white flowers) are of great help to the landscape gardener, as they flower from May to the winter. It has been naturalised all along the sustaining walls of the vineyards in French Switzerland and on the barren slopes and declivities of the mountain railways. *C. angustifolius* of South Europe, with its delicate, fragrant, light rose flowers and its glaucous foliage, is a real beauty in sunny rockeries. The *C. Velenowskyi,* of Bosnia, is a larger variety. All prefer lime to peat. Seed.



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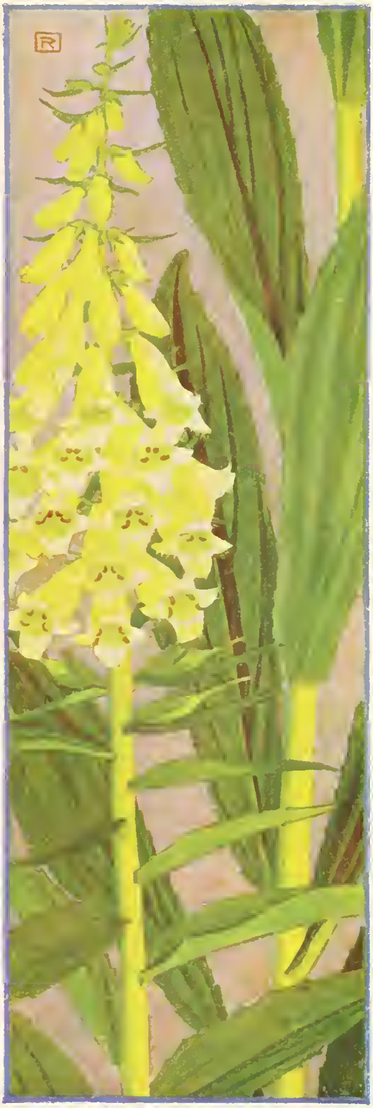

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CEPHALARIA *alpina.* Alpine Scabiosa. A very tall (1 to 1½ m. high) sulphur-yellow Scabiosa growing on steep slopes on the limy mountains in the south of Europe; big deep laciniate opposite leaves and yellow flowers in large heads on the top of the rigid stems. *C. leucantha* of South Europe, *tatarica* of Orient, and *Transylvanica* of East Europe are all big, strong plants with yellow flowers. All want a deep, light soil and half sun. Seed.

CERASTIUM. Snow-in-Summer or Argentine. Some of the species of this very common genus are grown in gardens, especially for borders, edging or carpeting purposes. Two or three only can be admitted in the rockery and almost all are good wall plants. They want sun. Division or seed.

C. album VI; 10 cm.; white; S. Eur.; 1, 4 (invading).
C. alpinum VI; 15 cm.; white; Eur.; 1, 4.
C. argenteum VI; 15 cm.; white; Or.; 1, 4 (invading).
C. Biebersteini V-VI; 20 cm.; pure white; Or.; 1, 4 (invading).
C. Boissieri VI; 10 cm.; white; S. Eur.; 1, 4.
C. bosniacum VI; 15 cm.; white; E. Al.; 1, 4.
C. carinthiacum VI; 10 cm.; white; E. Al.; 1, 4 (invading).
C. decalvans V; 5 cm.; white; Ba.; 6.
C. frigidum VI; 15 cm.; white; Ca.; 1, 4.
C. glaciale (*latifolium*) V; 8 cm.; pure white; Al.; 8, 10.
C. Illyricum VI; 10 cm.; white; E. Al.; 1, 4 (invading).
C. lanatum VI; 8 cm.; white; E. Al.; 1, 4 (invading).
C. lineare VII-IX; 10 cm.; white; It. Al.; 4, 6.
C. mœsiacum VI; 10 cm.; white; Tr.; 1, 4.
C. purpurascens VI; 10 cm.; white; Ca.; 1, 4.
C. strictum VI; 8 cm.; white; Eur.; 1, 4 (invading).
C. tomentosum VII; 15 cm.; white; S. Eur.; 1, 4 (invading).

C. villosum VI; 15 cm.; white; Tr.; 1, 4.
C. vulgare VI; 15 cm.; white; Eur.; 1, 4 (invading).

CERASTOTIGMA. See PLUMBAGO.

CERINTHE *alpina*. A glaucous Boragine with yellow and dark brown flowers, which is somewhat biennial.

CHÆNORRHINUM *glareosum*. A delicate dwarf Snapdragon from Spain. All summer through it gives some relatively large purple and white flowers, on short, leafy stems with thick, fat leaves. It wants a sunny, sheltered, well-drained spot on the rockery or a wall crevice and is increased by cuttings or seed.

CHÆNOSTEMA *campanulatum, fastigiatum,* and *polyanthum* are nice Scrofulariads from the Cape, with small delicate flowers of varied colours which are delightful on a rockery. Not quite perennial with us.

CHAMÆLIRIUM *carolinianum*. A small Liliad from North America with cream-white flowers on a 20 cm. high stem, flowering in April-May; it likes peat and half shade. Seed (slow germination).

CHAMÆMELON. Near Pyrethrum and belongs to the South and Oriental floras. The leaves are thin and dark green, generally creeping, carpeting the soil. *C. caucasicum* is prostrate, 20 cm. high, with a big Daisy-like flower; *C. oreades* is a downy, tufted plant with a medium-sized Daisy, but the best known of all is the *C.* (*Pyrethrum*) *Tschihatcheffii* which is used in our country for covering barren places in poor soil and in dry spots; it does as well in shady situations and is useful for the ornamentation of gardens, for paved walks, for dry slopes, etc. The Daisy-like flowers come in summer, but if you do not need them, you may use a lawn mower to cut them as well as for the lawn. Division, suckers, seed.

CHAMÆCYTISUS. See RHODODENDRON.

CHAMÆNERIUM. See EPILOBIUM.

CHEIRANTHUS. Wallflowers. Ornamental dwarf plants belonging to the Crucifers, often very fragrant and well known for ages as garden treasures. They like sunny situations and are propagated from seeds or cuttings.

C. Allionii. See *Erysimum.*
C. alpinus IV; 15 cm.; yellow; Sc.; 1, 4.
C. Cheirii. Common Wallflower. II-X; 30 cm.; yellow; S. Eur.; 1, 4. (Numerous garden vars., double, dwarf, and of different colours.)
C. Kewensis VII; 40 cm.; violet and bronze; hybrid; 4, 6.
C. Marshalli VII-VIII; 30 cm.; lilac; hybrid; 4, 6.
C. mutabilis VI-IX; 25 cm.; bright violet; Canaries; 4.*

CHELIDONIUM. Celandine. Poppyworts with orange red sap, near to Meconopsis; they haunt old walls in shady places and give yellow flowers. The *C. Franchetianum* from China and *C. laciniatum* from Europe are the ones worth growing. Half shade.

CHELONE. See PENTSTEMON.

CHERLERIA. See ALSINE *Cherleri.*

CHIMAPHILA. See PYROLA.

CHIONODOXA. Dear, small Oriental Liliads near to Scilla. They have sky-blue flowers, some, like *C. Luciliæ,* of the best azure; *C. Boissieri,* light blue; *cretensis,* deep blue; *Forbesi,* light blue; *gigantea,* azure; *Sardensis,* dark blue; *Tmoli,* light blue, are grown in gardens. All are suitable for the meadow, the rockery, or the sunny border. Seed.

CHLORA. Yellowwort. A curious Gentianad with yellow flowers, opposite bluish leaves; biennial.

CHRYSANTHEMUM offers some good plants for the rockery, although many, such as *macrophyllum* and *maximum,* are hugely developed. The alpine and mountain species are dwarf plants, often of difficult cultivation; they can be increased from seed or by cuttings.

C. alpinum V; 8 cm.; white; Eur., Al.; 8, 10.
C. arcticum VI; 15 cm.; light rose; 1.
C. ceratophylloides VI; 25 cm.; white; It., Al.; 1.
C. chloroticum VI; 30 cm.; white; Atl.; 1.
C. cineræfolium VII; 25 cm.; white; Dalmatia; 1, 4. M.
C. coronopifolium (*atratum*) VII; 30 cm.; white; S. Al.; 1.
C. Gayanum VI-IX; 15 cm.; bright pink; Atl.; 6.
C. heterophyllum VI; 25 cm.; white; Al.; 1.
C. hispanicum VII; 30 cm.; yellow; Sp.; 1.
C. lacustre VIII-X; 50 cm.; white; Sp.; 1.
C. latifolium VII; 40 cm.; white; Py., Sp.; 1.
C. maximum VI-IX; 1 m.; white; Py., Sp.; 1. (Many garden varieties.)
C. montanum VII; 25 cm.; white; S. Eur.; 1.
C. nipponicum VIII-X; 40 cm.; white; Jap.; 1.*
C. tibeticum VIII; 15 cm.; pinkish; Tibet; 6, 8.
C. tomentosum VII; 10 cm.; white; Co., Py., S. Al.; 4, 6, 10.
C. Zawadskyi VI-IX; 20 cm.; rose pink; S. Eur.; 1, 6.

CHRYSOGONUM *virginianum.* A beloved North American Composite forming masses of yellowish-green foliage and giving all summer through bright yellow flowers similar to Arnica. The plant creeps over the soil, and is easy to divide.

CHRYSOPSIS. Golden Aster. Another yellow-flowering Composite very common in Northwest America. I saw many kinds flowering upon the rocks of California, Oregon, and even in the deserts. They are little shrubby tufts of greyish leaves, withstanding the hottest sun in the driest situations. The type *villosa* is the best known in gardens; it is 25 cm. high, has bright yellow flowers from May to November and is very hardy. Its variety *Rutteri* is dwarfer; *camphorata* is densely glandular; *C. foliosa* is 40 cm. high; *Breweri* is a 40 cm. high little shrub; and *oregana,* 40-60 cm. high, has a very hirsute foliage. They can be propagated from seed, division, or cuttings.

CHRYSOSPLENIUM. Golden Saxifrage. Small Saxifrages forming masses of gay green foliage on damp places in the mountain regions of the Northern Hemisphere; they bear innumerable minute golden blooms set in green involucres. All are good for the banks of rivulets or damp places in rockeries. Division or seed. The following are in gardens: *C. alternifolium* with alternate leaves; *oppositifolium* with opposite leaves, both Swiss and European; *americanum, glaciale,* and *tetrandum* which are arctic and boreal; *rosulare,* an Oriental species.

CIMICIFUGA. Bugbane. Cousins of the Actæa; they have spreading foliage like that of the *Spiræa Aruncus* and, in later summer or even late in the fall, pure white flowers. They like shade and are propagated from seed (slow germination) or by division. In cultivation are *C. americana, cordifolia, elata, racemosa,* all American, and tall (40 cm. to 1 m. high); *fœtida* from East Europe and Siberia; *Japonica* and *simplex* from Japan. This last is the best, presenting marvellous spikes of pure white flowers just before the winter.

CINERARIA. See SENECIO.

CIRCÆA. Onagrads (Fuchsia family) with very small and unshowy pink-white flowers in narrow clusters which grow in the deep shade of the woods; they are precious for the decoration of shady corners in the rock garden or for underwoods. All are very stoloniferous and invading. *C. alpina* (the smallest one), *C. intermedia* and *C. Lutetiana* are European and North American, while *cordata* and *mollis* are Japanese.

CIRSIUM. A group of Thistles about which some people, especially Englishmen and Scotchmen, are enthusiastic. Some, of course, are decorative and find their place on big rockeries or in the wild garden. Division or seed.

C. acaule VII; 15 cm.; bright carmine; Eur.; 1, 7.
C. eriophorum VII; 1 m.; carmine; Eur.; 1.
C. Erisithales VII-X; 80 cm.; cream yellow; Eur.; 1, 2.
C. heterophyllum VII; 1 m.; deep rose; Eur., Si.; 1, 3.

C. monspessulanum VI-IX; 1 m.; dark carmine; S. Eur.; 1, 2, 3.

C. spinosissimum VII; 40 cm.; cream white; Eur., Al., Si.; 1, 8.

CISTUS. Rock Roses. The brightest glory of the Southern "Garrigues" or "Maquis." They adorn the most arid and desolate slopes with their brilliant and, alas, fugitive flowers, and without these beautiful stars the South would lose a charm. They are small or big evergreen shrubs, some having greyish-green leaves (*albidus, creticus, crispus, cyprius, hirsutus, incanus, purpureus, salvifolius, tauricus, villosus*); others dark green, strong smelling, and glutinous (*corbariensis, ladaniferus, laurifolius, monspeliensis, populifolius*). They are a good element for sheltered, sun-exposed rockeries or for the garden border, even for the wild garden. They succeed in any light and sandy soil. Seed or cuttings. The Cistus are very variable and cross with the greatest facility; therefore, there are numerous hybrids and varieties.

C. albidus VI-VII; 1 m.; light carmine; Med.; 1.*

C. algarvensis VII; 25 cm.; yellow; Sp., Portugal; 1.*

C. corbariensis; hybrid, *salviæfolius* x *populifolius;* 50 cm.

C. corsicus VII; 80 cm.; bright carmine; Med.; 1.

C. creticus VI; 80 cm.; bright carmine; Crete; 1.*

C. crispus VII; 60 cm.; rose; Med.; 1.

C. florentinus VI; 1 m.; white; It., Al.; 1.

C. hirsutus VI; 1 m.; white; Sp.; 1.*

C. incanus VII; 1 m.; bright carmine; Med.; 1.*

C. ladaniferus VI-VII; 1 m.; white and brown spot; Med.; 1. Ar. (A variety *immaculatus* without the brown spots.)

C. laurifolius VI-VII; 1 m.; white; Med.; 1.

C. monspessulanus VI-VII; 80 cm.; cream white; Med.; I. P.*
C. populifolius VI; 80 cm.; pure white; S. W. Eur.; I.
C. purpureus VI-VII; 70 cm.; bright carmine; Med.; I. P.*
C. salvifolius VI; 60 cm.; pure white; Med.; I. P.

CLAYTONIA. Spring Beauty. Small American and Asiatic Portulacas with succulent leaves, some of which are eaten as "greens." Small flowers disposed in clusters. Some are annuals but they sow themselves in the cool places of the rockery or of the wild garden. They like a moist, half-sunny situation and porous soil. *C. asarifolia* (white), *caroliniana* (pink), *aurea* (gold yellow), *Chamissoi* (pale rose), *lanceolata* (pink), *megarrhiza* (pink), *sibirica* (light pink), and *virginica* (pink) are perennials and very easy to raise from seed; the *cordifolia* (rose), *diffusa* (light pink), *Howelli* (white), and *perfoliata* (white) are annuals.

CLEMATIS *alpina.* See ATRAGENE.

CLINTONIA. Dogberry. Woodland Liliads growing in the shady woods of Japan, China, and North America. They have large oval leaves at the base and scapes from 10-25 cm. high with umbels of flowers at the end and dark blue or black shining berries as fruits. *C. borealis* from the Eastern U. S. has yellow flowers and dark blue berries; *C. Andrewsiana* from California has nodding rose-pink flowers and brilliant blue berries; *C. udensis* (Siberia and Japan) has white flowers; *C. umbellata* from N. Am., white flowers and black shining berries. *C. uniflora,* Bride's Bonnet, from the California forests has narrow leaves and one white flower. They all like moist soil and a shady situation, and are increased by division or from seed (slow germination).

CNICUS. Thistles near to CARDUUS and CIRSIUM and often synonymous with them.

COCHLEARIA. A group of alpine and maritime Crucifers which grow in moist places or between rocks. *C. anglica* and *danica* haunt the maritime rocks; I saw them splendidly flowering on the west coast of Ireland and of France but they are nothing special for the rock garden. For *C. saxatilis* see KERNERA and for *C. alpina* see RHIZOBOTRYA.

CODONOPSIS (GLOSSOCOMIA). Asiatic Bellflowers often named Wahlenbergia. They have nodding flowers of pale colour and keep their beauty for use as cut flowers, the inside of the bell being richly coloured. They want good light soil on a high bank in the garden or on the rockery; some are climbing or half climbing but none of them is really attractive. Seed. The best for gardens are *C. clematicea,* whitish flowers stained with blue; *convulucea,* light blue; *lanceolata,* lilac bells darker inside; *ovata,* yellowish, rich coloured inside; *purpurea,* large purple bells; *rotundifolia* (*lurida*), greyish purple; *Tang-sheng, ussuriensis,* and *viridiflora* with greenish-white flowers.

COLCHICUM. Autumn Crocus. Well-known bulbous plants which in autumn adorn all the moist fields of Europe and Western Asia. They like deep moist soil and are increased from seed (slow germinating).

C. agrippinum X; 30 cm.; bright purple; Or.; 7.
C. alpinum VIII; 5 cm.; violet rose; Al.; 1, 7, 10.
C. arenarium IX; 8 cm.; lilac; Ap., Cp.; 1, 7.
C. autumnale X; 15 cm.; rose lilac; Eur.; 1, 7. (Var. *alba, fl. pl.,* etc.)
C. Bertoloni IX; 10 cm.; bright lilac; Or.; 1, 7.
C. Bivonæ IX; 10 cm.; rose; It., Gr.; 1, 7.
C. Bornmülleri VIII-IX; 30 cm.; rose lilac; Or.; 1, 7.
C. byzantinum IX; 20 cm.; rose lilac; Or.; 1, 7.
C. candidum IX; 10 cm.; white; Or.; 1, 7.
C. Decaisnei IX; 15 cm.; pale lilac; Or.; 1, 7.
C. libanoticum IV; 10 cm.; rose with yellow anthers; Or.; 6.
C. luteum 10 cm.; yellow; Tu.; 6, 10.
C. montanum IX; 15 cm.; lilac; Or.; 1, 7.
C. neapolitanum IX; 20 cm.; bright lilac; Cp., Ab.; 1, 7.
C. Sibthorpi IX; 25 cm.; lilac; Gr.; 1, 7.
C. speciosum X; 25 cm.; lilac rose; Or.; 1, 7.
C. umbrosum IX; 15 cm.; lilac; Or.; 1, 7.
C. variegatum IX; 15 cm.; purple and lilac; Or.; 1, 7.

COLUREA. See WALDSTEINIA.

COLUTEOCARPUS *reticulatus* is a small, vernal, Oriental Crucifer with pure white flowers (February to April) 10 cm. high, good for the wall or sunny fissures of the rockery. Seed.

COMARELLA *multifoliata* (*Ivesia Gordonii*). A desert plant of Western America, near to Potentilla, with curious, narrow, erect multifoliolate leaves; small brownish flowers on bare fine stems 20 cm. long. Division, cuttings, or seed.

COMARUM *palustre* is a dwarf shrub creeping in the sphagnum or on the turf marshes, with deep brown stems, bluish-green leaves, and brown flowers; it can reach 30 cm. in height in good turfy or sphagnoid soil destitute of lime; belongs to the Rosaceæ. The *C.* (*Potentilla*) *Salesowiana,* from Siberia, is erect, with shining beautiful foliage and rose flowers; its seeds are strongly sternutative. Same culture and situation. Propagation from seed or division.

CONANDRON *ramondioides.* Rock Tobacco. One of those delicate treasures sent us from Japan, but which few rock gardeners are able to acclimatise. It is strongly calcifuge and cannot endure the slightest particle of lime. It has a thick root, ample fleshy reticulate foliage, and lilac flower with a yellow eye on an 8-10 cm. high stalk. It cannot stand our winters and must be sheltered. Pure peat, half sun. Propagated from seed or fragments of the fleshy tuber.

CONVALLARIA *majalis.* Lily-of-the-Valley. An old-time denizen of gardens. There are varieties with pink, double, and big flowers and variegated leaves. *C. m. rosea, fl. pl., grandiflora* and *fol. marginata.*

CONVOLVULUS. Bindweed. This genus contains generally showy plants, many being annuals, others tender ones which must be grown in houses, and some twenty kinds are really good plants for the rock garden. Some have beautiful silk-white foliage. They hail from Southern countries and want sun; some of them sheltered places. Cuttings, division, suckers, or seed.

C. althæoides VI-X; 30 cm.; climbing; bright pink; Med.; 1, 4, 6.

C. cantabricus VI-IX; 15 cm.; light rose; S. Eur.; 1.

C. cneorum VII-X; 40 cm.; milk white and pink; S. Eur.; 1.*

C. cochlearis VIII; 20 cm.; rich purple; G.; 1, 4.

C. cyprius VI; 8 cm.; light pink; Cyprus; 4.*

C. Dorycnium VII; 20 cm.; rose pink; Gr.; 6.

C. Dryadum VII; 60 cm.; pale rose; Atl.; 4.*

C. lanuginosus VIII; 20 cm.; pinkish white; Sp.; 1, 4. L.*

C. libanoticus VII; 10 cm.; rose; Leb.; 4, 6.

C. lineatus VII; 5 cm.; white and rose; S. Eur.; 4, 6.

C. mauritanicus VI-X; 15 cm.; violet blue; Atl.; 1.*

C. nitidus VII; 10 cm.; whitish rose; Sp.; 4.

C. olæfolius VII; 25 cm.; white or rose; Gr.; 1.*

C. persicus VI-IX; 30 cm.; white; Persia; 1.

C. sabatius VII; 15 cm.; violet blue; It.; 4.*

C. Scammonia VII; climbing; whitish rose; Or.; 1.

C. Soldanella VIII; 25 cm.; rose pink; Maritime regions; 1.

C. stans VIII; 10 cm.; pure white; N. Am.; 1.*

C. tenuissimus VII-IX; 20 cm.; bright pink; Gr.; 1, 4.*

COPTIS *trifolia.* A dwarf trifoliate Ranunculad from the shady woods of North America; it bears a little white starcup and is a lime-hater which cannot succeed but in peat.

COREMA *alba* is a white-berried Portugal Empetrum; peat and half sun in the rockery. Cutting or seed.

COREOPSIS *rosea* is a nice small American plant with fine foliage and clear, rose-pink Daisies all the summer through; porous damp soil and sun; division or seed. The other Coreopsis are big bright yellow-flowering plants well suited for the border or for the big rock gardens.

CORIS *monspeliensis* is a delicious primulaceous from South Europe with fine pink-violet and yellowish flowers on long and narrow spikes; it flowers the whole summer and wants a sheltered, sunny, dry position and sandy soil. Seed or cuttings.

CORNUS. Dogwood. This genus is represented by big shrubs and sometimes small trees such as the marvellous North American *C. florida* and *Nuttali;* there are two dwarf ones, *C. canadensis* and its Swedish cousin, *C. suecica,* which are really good for rockeries. Both are creeping ramblers with oval-pointed leaves, forming large masses on the ground and giving white flowers on 10-15 cm. high stalks; these flowers are very small but they are enclosed in a large collar formed by four white bracts. They want peat and a half-shady position and can be propagated by division or seed (slow germinating).

CORONILLA. A papilionaceous group related to the Brooms and peculiar to the Southern limestone countries. They are herbaceous or shrubby, have compound leaves and flowers in clusters. They generally like sun, lime, and good soil. Propagated by seed, cuttings, or division.

C. cappadocica (*iberica*) VI-X; 15 cm.; yellow; Or.; 1 (creeping).
C. Emerus IV; 1-2 m.; yellow; Eur.; 1. L.
C. glauca VI; 25 cm.; bright yellow; S. Eur.; 1.
C. globosa VII; 30 cm.; white and pink; Or. 1.
C. juncea VII; 50 cm.; bright yellow; S. Eur.; 1.*
C. libanotica VII; 30 cm.; yellow; Or.; 1.
C. lotoides VI; 10 cm.; yellow; S. Eur.; 6.

C. minima VI; 8 cm.; yellow; S. Eur.; 1.
C. montana (*coronata*) VI-IX; 15 cm.; yellow; Eur.; 1.
C. vaginalis V-IX; 10 cm.; yellow; Eur.; 1, 4.
C. valentina VII; 15 cm.; yellow; S. Eur.; 1.
C. varia VI-IX; 10-80 cm.; pink and lilac; Eur.; 1 (invading).

CORRIGIOLA *littoralis* and *telephiifolia* are small Paronychiads with whitish flowers grouped in small heads; rather invading weeds from S. Eur.

CORTUSA. An elegant group of Primulas with cordate foliage, small nodding flowers on thin stalks. They all want a cool, half-shady place in the rockery and are increased from seed (slow germ.), or division. *C. hirsuta* is from Transylvania; *Matthioli* and its var. *grandiflora* from the Alps and Siberia; *Protteri* from the Himalayas; *pubens* from Transylvania; *villosa* from the Eastern Alps.

CORYDALIS. Fumatory. Important genus of rock, wall, and woodland plants, some being tuberous. They generally want shade and are propagated from seed (slow germ.).

C. angustifolia VI; 30 cm.; pink; E. Eur.; 2.
C. australis (*solida*) III; 15 cm.; light rose; S. Eur.; 2, 6.
C. bulbosa (*cava, tuberosa*) II-III; 15 cm.; white or pink; S. Eur.; 2.
C. capnoides IV; 15 cm.; yellow; S. Eur.; 4.
C. caucasica IV; 10 cm.; purple; Ca.; 2.
C. cheilanthifolia III-X; 25 cm.; yellow; Ch.; 2, 4.
C. glauca IV-VII; 15 cm.; rose; N. Am.; 1. Biennial.
C. Halleri III; 15 cm.; rose; Si.; 1, 2.
C. Kolpakowskyana VI; 15 cm.; yellow; Or.; 1, 2.
C. Ledebouriana IV; 15 cm.; rose; Si.; 1, 2.

C. lutea IV-XI; 20 cm.; bright yellow; S. Eur.; 1, 2, 4.
C. nobilis VI; 20 cm.; yellow and brown; Si.; 1.
C. ochroleuca VI-X; 20 cm.; light yellow; S. Eur.; 1, 4.
C. ophiocarpa V; 30 cm.; yellowish; H.; 1.
C. pauciflora VI; 20 cm.; violet; Si. Or.; 1.
C. rutæfolia IV; 15 cm.; rose; Or.; 1.
C. Semenowi VI; 20 cm.; yellowish; Or.; 1, 2.
C. thalictrifolia VI-IX; 20 cm.; yellow; Ch.; 1.
C. tomentella VI-IX; 10 cm.; yellow; Ch.; 4, 8.
C. Wilsonii VII-IX; 15 cm.; yellow; Ch.; 4.

COSSONIA *africana* is a dwarf Crucifer very similar to *Morisia hypogæa* which comes from the Atlas and grows in meagre and sandy soil on very sunny exposed banks; like a weed at Floraire. Seed.

COTONEASTER. These shrubs are generally adapted to the shrubbery but some of them are valuable for the rockery and especially the very dwarf and creeping ones as *adpressa, congesta, humifusa,* and *thymifolia.* The so-called pyrenaica (prostrate) is a gardener's lapsus. Seeds (slow germ.) or cuttings.

COTULA (LEPTINELLA). Dwarf creeping and invading Daisies which form carpets of ferny evergreen foliage for sheltered, half-sunny places on the rockery, paved walk, or barren slopes. They are New Zealanders and three kinds are cultivated in our region: *C. dioica, pyrethrifolia,* and *squalida.* Their flowers have no interest.

COTYLEDON. Life-for-Ever. Succulents near Sempervivum and Echeveria. They adorn the barren rocks at the Pacific Coast and I wondered at them there, prospering under the most trying conditions.

They want sunny exposure and dread moisture; propagation from seed, division, or leaf-cuttings.

C. cæspitosa VIII; 30 cm.; yellowish; Cal.; 4.*
C. (*Stylophyllum*) *edule* VII; 30 cm.; yellowish; Cal.; 4.*
C. farinosus (Bluff Lettuce) 30 cm.; red; Mexico; 4.*
C. lanceolata (Desert Saviour) VII; 25 cm.; yellowish; Cal.; 4.*
C. Purpusii VIII; 30 cm.; red and yellow; Cal.; 4.*

CRAMBE (See also UMBILICUS). Sea-Kale. A sort of big Cabbage whose type is the English Sea-Kale growing all about the maritime coasts of West Europe. The *C. cordifolia, juncea, orientalis, Kotschyana,* and *tatarica* are grown in gardens either on big rockeries or in the wild and picturesque gardens. They have numerous white flowers, in large panicles, big leaves and a disagreeable smell and want deep soil and sun. Seed.

CREPIS. Composites near to Dandelion, some of which are really worthy of culture, but none is very easy to grow; they want fresh damp soil and sun. Seed or division.

C. aurea VI; 15 cm.; bright yellow or red brown; Eur.; 3, 10.
C. grandiflora VI; 40 cm.; yellow; Eur.; 1, 6.
C. incarnata VII; 30 cm.; bright rose; E. Al.; 6.
C. incisa VII; 10 cm.; pink; Gr.; 6.
C. pygmæa VI; 8 cm.; yellow; Al. Py.; 8, 10. L.

CROCUS belong essentially to European and Oriental mountains; they find their place in the alpine garden or the rockery for early spring and late autumn bloom; they are well known and need no description here. They are propagated by seed (slow germinating) and from corms. The best spring blooming are: *ancyrensis,* yellow; *aureus,* yellow; *banaticus,* dark purple; *biflorus,* white and purple; *Imperati,* pale lilac; *Sieberi,* light blue; *susianus,* bright yellow; *vernus,* white or purple; *versicolor,* lilac; *vitellinus,* orange yellow and sweet smelling. The best autumnal kinds are: *C. cancellatus, cilicicus,* blue; *Clusii,* light mauve; *hyemalis,* white; *iridiflorus,* purple violet; *medius,* purple lilac; *pulchellus,* light blue; *sativus* (the Saffron), bright purple;[4] *speciosus,* bright blue; *zonatus,* light lilac.

CRUCIANELLA *stylosa* or *Phuopsis stylosa* (Crosswort), from the mountains of North Persia and Afghanistan, is one of the treasures of the rock garden. It is a rubiaceous plant forming dense carpets of grey-green thin foliage, 20-25 cm. high, covering the ground and giving, from May to November, masses of flesh-rose flowers in dense terminal clusters; there is a variety *carminea* with bright carmine flowers. Useful creepers for the shady or half shady and even for sunny parts of a natural garden; can be used for carpeting slopes, for big rockeries, etc. Easy to propagate by seed, cuttings, or division.

CYANANTHUS. A Bellwort with dark blue flowers of great beauty when well grown, coming from Central China but rather difficult, at least with us. Their great advantage is that they flower in the late summer. They must be grown in the moraine or in a half-shaded spot on the rockery in peat; propagation by cuttings or seeds. *C. lobatus,* for nearly a century in cultivation, has prostrate shoots some 20 cm. in length and large, dark blue flowers, accompanied with small dark leaves like bracts, lobed like feathers at the tip and more or less woolly. *C. incanus* with shinier and paler flowers; *Forrestii* of lavender colour; *integer* with narrow oblong leaves, hairy on both sides, but becoming gradually smooth; and *leiocalyx* from Yunnan with yellow flowers, are newly introduced kinds.

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[4] For the medicinal uses and the history of the Saffron, see H. Correvon, *Plantes et Santé,* 2d ed., p. 249.

CYCLAMEN. One of the most beloved genera in gardens and cultivated since the end of the sixteenth century. Some have very big corms; I have one of the rare *C. Rolfsianum* from the Cyrenaic Desert weighing nearly a pound and measuring 12 cm. broad and 9 cm. high. Mr. Stapely of Steplehurst, England, had a *C. europæum* forty years old which gave more than 500 flowers! They are generally of easy culture but fear damp soil and so need a well-drained ground; a rich humus soil is the most suitable for them; propagation from seed.[5]

C. africanum (*macrophyllum*) IV; 15 cm.; pale rose; At.; 6.*
C. alpinum III-IV; 10 cm.; bright rose; Or.; 6.
C. Atkinsii; a garden hybrid, *C. Coum* x *ibericum.*
C. balearicum II-IV; 8 cm.; white; S. W. Eur.; 6. Fragrant.

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[5] For a complete account of Cyclamen see Hildebrand, *Die Gottung Cyclamen,* Jena, 1898.

C. cilicicum VIII-IX; 10 cm.; rose; Gr.; 6. Fragrant.
C. colchicum IX-X; 15 cm.; bright pink; Ca.; 1, 6. Fragrant.
C. Coum I-III; 8 cm.; pink or white; Gr.; 1, 6.
C. cyprium VIII; 10 cm.; rose; Or.; 6.
C. europæum VII-IX; bright pink; S. Eur.; 1, 2. Fragrant. (Vars. *albiflorum, grandiflorum,* and *roseum.*)
C. græcum IX-X; 15 cm.; rose; Gr.; 6.
C. hederæfolium (*neapolitanum*) IX-XI; 15 cm.; rose; S. Eur.; 1, 2. (Var. *albiflorum,* pure white.)
C. Ibericum II-III; 10 cm.; bright carmine; Ca., Or.; 6.
C. latifolium (*persicum*) XI-IV; 20 cm.; rose; 6.*
C. libanoticum I-V; 15 cm.; light rose; Leb.; 6.
C. repandum III-V; 10 cm.; bright carmine; S. Eur.; 6. Fragrant.
C. Rohlfsianum IX-XI; 30 cm.; light pink; Cyrenaic; 6.*

CYNOGLOSSUM is a big coarse Borage near to Anchusa, with sky-blue flowers, generally biennial. The one we may include in our list is *C. nervosum,* 30 cm. high, which is half perennial and has beautiful azure-blue flowers from July to September. It wants sun, and is propagated from seed.

CYPRIPEDIUM. See TERRESTRIAL ORCHIDS.

CYTISUS. Broom. Good shrubs for the rock garden with three-foliate leaves, yellow, white, or carmine flowers disposed in clusters or in spikes. They all want a sunny place, light soil, and are propagated from cuttings, seed, or grafted upon the Common Laburnum.

C. albus V-VI; 1 m.; pure white; Atl., Sp.; 1.
C. Andreanus; a bicolor, brown and yellow scoparius.
C. Arduini V; 20 cm.; bright yellow; S. Al.; 1.
C. argenteus VI; 20 cm.; yellow; S. Eur.; 1.*
C. austriacus VI; 50 cm.; bright yellow; E. Eur., Ca.; 1.

C. biflorus V; 1 m.; yellow; E. Eur.; 1.
C. capitatus V-VIII; 1 m.; pale yellow; E. Eur.; 1.
C. Dallimoreanus; a bright carmine and purple hybrid, *albus* x *Andreanus.*
C. decumbens (*Genista Halleri*) VI; 25 cm.; yellow; Eur.; 1, 6.
C. elongatus VI; 60 cm.; yellow; Cp., Tr.; 1.
C. falcatus VI; 50 cm.; yellow; E. Al., Tr.; 1.
C. Friwaldkyanus (*Shipkænsis*) VI; 20 cm.; yellowish; Ba.; 1.
C. hirsutus VI-IX; 1 m.; light yellow; S. Eur.; 1.
C. Kewensis V; 40 cm.; white and yellow (hybrid); 1.
C. leucanthus VI; 1 m.; yellow; Cp., Ba.; 1.
C. nigricans VI; 80 cm.; bright yellow; Eur.; 1. P.
C. præcox V; 80 cm.; light yellow (garden hybrid); 1.
C. purpureus V-VII; 20 cm.; purple and carmine; S. Eur., Or.; 1.
C. pygmæus VII; 15 cm.; yellow; Or.; 1.
C. ruthenicus VI; 50 cm.; yellow; Or.; 1.
C. sessilifolius VI; 80 cm.; bright yellow; S. Eur.; 1.
C. supinus VIII; 25 cm.; yellow; S. Eur.; 1.
C. triflorus V; 1 m.; yellow; S. Eur.; 1.
C. Weldeni VI; 50 cm.; yellow; E. Al.; 1.

DABÆCIA (MENZIESIA) *polifolia* is a charming Heath from the Western Pyrenees and Western Europe. It hangs from the rocks in the neighbourhood of Bayonne and Biarritz and these masses of carmine bells on dark foliage 20 cm.-40 cm. high are one of the marvels to be seen. There is a white-flowering variety. Peat and half shade. Division, cuttings, or seed.

DALIBARDA *repens* (*Rubus Dalibarda*) is a creeping Blackberry from North America, with round, scalloped leaves and white Strawberry-like flowers, which is to be grown on peat in a shady place. Propagation from seed or runners.

DAPHNE. One of the wonders of the mountain flora. They adorn the slopes of the mountains of the Northern Hemisphere and their sweet and delicious smell is a real enjoyment. They are not all easy to cultivate and some are not quite hardy with us. We have succeeded at last in getting almost the whole collection of introduced kinds, but only after great difficulties! In the Pyrenees a hybrid between the *D. cneorum* and the *D. Philippii* was found which we named *D. Rossetti* after the man who discovered it (a gardener at Floraire) and, on the Tombea (Lago di Garda), another hybrid, *rupestris* x *striata*. They are propagated from seed (slow germination), from cuttings, or grafting. (See color plate facing p. 166.) (ev. = evergreen.)

D. acuminata VI; 30 cm.; white; Or.; 1. ev.

D. acutiloba IV; 50 cm.; white; Ch.; 1.

D. alpina V; 60 cm.; white; Limestone Alps; 1', 4; L.

D. altaica V; 50 cm.; white; Si.; 1, 6.

D. arbuscula of Dr. Christ is a Jurassic form of *D. Laureola;* ev.

D. arbuscula of gardens is a narrow-leaved *cneorum* from Austria; ev.

D. atropurpurea; a dark brown-leaved *D. Mezereum.*

D. aurantiaca VII; 40 cm.; bright orange; Ch.; 6. P. ev.*

D. autumnale; an autumnal *D. Mezereum* with large flowers.

D. Blagayana III; 20 cm.; cream white; E. Al.; 1, 6. ev.

D. buxifolia V; 30 cm.; white; Or.; 4, 6. ev.

D. caucasica VI; 1 m.; white; Ca.; 1, 2.

D. cneorum, Garland Flower, IV; 20 cm.; rose; Eur.; 1, 4, 6. L. ev. (Varieties *album, grandiflorum* (*major*), and *fol. var.*)

D. collina (*D. Fioniana*) VI; 30 cm.; purple; It.; 1. ev.*

D. delphini or *Dauphini* or *hybrida;* a hybrid, *collina* x *odora.* ev.

D. Fortunei; a *D. Genkwa* with erect clusters of flowers.

D. Genkwa VI; 80 cm.; lilac blue; Jap.; 6.*

D. Girardi V; 30 cm.; yellow; Ch.; 6.*

D. glomerata VI; 30 cm.; pink; Ca.; 6. ev.

D. Gnidium VI; 80 cm.; whitish; S. Eur.; 6. ev.*

D. jasminea VI; 5 cm.; light pink; Gr.; 4. ev.

D. Jezoensis VI; 50 cm.; yellow; Jap.; 6. ev.

D. Kamtschatica VI; 50 cm.; white; Si.; 1, 7.

D. Laureola IV; 40 cm.; yellowish green; Eur.; 1, 2; L. ev.

D. Mazelii is a pink-flowering hybrid of unknown origin; ev.

D. Mezereum (*Mezereon*) II-III; 1 m.; rose; Eur., As.; 1, 2. (Vars. *album, album plenum, alpinum, grandiflorum,* and *fol. var.*)

D. neapolitanum; a hybrid, *cneorum* x *collina.* ev.

D. odora IV; 30 cm.; light rose; Jap.; 1. ev. (A variety *fol. marginata,* yellowish bordered.)

D. oleoides V; 20 cm.; white; Gr.; 4, 6.

D. petræa (*rupestris*) IV-V; 5-10 cm.; rose; It., Ab.; 4. L. ev.

D. petræa grandiflora was found in the cultures at Floraire.

D. Philippii is a Pyrenæan form of *Laureola;* ev.

D. pontica IV; 60 cm.; greenish; Or.; 1, 2. ev.

D. pseudo-Mezereum V; 40 cm.; yellow; Ch.; 6. P.

D. retusa V; 30 cm.; light rose; Ch.; 6. ev.

D. Rossetti hybrid, *cneorum* x *Philippii,* of the Pyrenees.

D. sericea IV; 40 cm.; purple violet; Ca.; 1, 6.

D. Sophia VI; 50 cm.; white; Si.; 1, 6.

D. striata IV; 15 cm.; rose; It., E. Al.; 4, 6. ev.

D. Tangutica V; 50 cm.; yellowish; Ch.; 1, 2. ev.

D. Thauma hybrid, *petræa* x *striata,* found on the Italian Alps.

D. Verloti V; 20 cm.; rose; Dauphiné; 4, 6. ev.

DARLINGTONIA *californica.* Calf's-Head. From N. W. Am., a very curious Pitcher-plant near Sarracenia with leaves enlarged upward into a rounded hood with a two-forked appendix; flower dark purple, veined and maculated. It is to be grown in sphagnum or in the bog. Seed.*

DELPHINIUM. Larkspur. Well-known plants, annual or perennial, which thrive in any deep rich loam or on drained places of the rockery. They all come easily from seed and flower in summertime, from June to September. The California red and the Oriental tuberous kinds need to be kept dry when at rest.

D. alpestre VII; 25 cm.; bright blue; R. M.; Colorado; 1.

D. alpinum VI; 1 m.; blue; E. Al.; 1'.

D. azureum VI; 1 m.; azure blue; N. Am.; 1.

D. Belladona; a beautiful low var. of *elatum* with big flowers; numerous garden varieties.

D. bicolor VII; 25 cm.; yellow and blue; R. M., Cal.; 1.

D. Brunonianum VII; 1 m.; intense blue; H.; 1.

D. Bulleyanum VII; 1 m.; violet blue; Ch.; 1.

D. cardinale VIII; 40 cm.; scarlet red; Cal.; 6.

D. cashmirianum VII; 30 cm.; violet; H.; 6.

D. caucasicum VII; 1 m.; dark purple blue; Ca.; 1.

D. cheilanthum VII; 80 cm.; purple violet; Si.; 1.

D. cœlestinum VII; 60 cm.; light blue; Ch.; 6.

D. cœruleum VII; 30 cm.; sky blue; H.; 6.

D. dasianthum VII; 30 cm.; bright blue; Si.; 1.

D. Davidii VIII; 1 m.; light blue; Tibet; 1.

D. elatum VI; 1 m.; blue; Eur.; 1. L.

D. formosum VII; 1 m.; deep blue; Or.; 1.

D. glaciale VII; 50 cm.; purple blue; H.; 6.

D. grandiflorum (*sinense*) VII-IX; 50 cm.; pure blue; Ch.; 1. (Vars. *album, azureum, grandiflorum, nanum,* etc.)

D. hybridum; numerous beautiful garden vars.; single and double; for the borders.

D. likiangense VII; 30 cm.; bright blue; Ch.; 1.

D. Menziesii VII; 30 cm.; blue; Calif.; 1.

D. nudicaule VII; 30 cm.; scarlet red; Calif.; 1, 6.[6]

D. occidentale VII; 1 m.; light blue and yellow; R. M.; 1.

D. Parryi VII; 60 cm.; blue purple; R. M.; 1.

D. Pylzowi VII; 50 cm.; deep blue; Ch.; 1.

D. sulfureum is an annual generally sold as Zalil.

D. tatsienense VII; 25 cm.; sky blue; Ch.; 1.

D. triste VI; 50 cm.; blackish brown; Tu.; 1, 6.

D. tyrolense; a deep blue *elatum.*

D. trolliifolium IV; 30 cm.; sky blue; R. M.; 1.

D. vestitum VIII; 1 m.; deep violet; H.; 1.

D. Yunannense; a dwarfer form of *grandiflorum.*

D. Zalil VII; 1 m.; straw yellow; Tu., Afghanistan; 6.

DENTARIA or CARDAMINE. Toothwort. Woodland plants of large dimensions, belonging to the Crucifers. They grow in shady woods or on damp, half-shady corners of the mountain regions in Europe, North Asia, and North America. They all like cool places and leaf mould or good garden loam, and are increased from seed, division, or bulblets.

D. bulbifera IV; 25 cm.; dark lilac; Eur., As.; 1, 2.

D. corymbosa V; 20 cm.; light rose; Calif.; 1, 2.

D. digitata IV; 30 cm.; bright lilac; Eur.; 1, 2.

D. diphylla IV; 15 cm.; lilac; E. Eur.; 1, 2.

D. enneaphylla IV; 25 cm.; milk white; Eur.; 1, 2.

D. glandulosa IV; 10 cm.; carmine; Cp., Tr., Si.; 1, 2.

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[6] On the hills of California I saw this 1½ m. high!

D. integrifolia IV; 30 cm.; whitish rose; R. M.; 1, 2.
D. laciniata IV; 25 cm.; lilac; N. Am.; 1, 2.
D. macrocarpa IV; 25 cm.; violet; R. M.; 1, 2.
D. pinnata IV; 30 cm.; pale lilac; Eur.; 1, 2; M.
D. poliphylla V; 25 cm.; yellowish white; E. Al., Cp.; 1, 2.
D. Saviensis IV; 20 cm.; white; E. Al.; 1, 2.
D. tenella IV; 30 cm.; violet rose; R. M.; 1, 2.
D. trifolia IV; 15 cm.; lilac; Ba.; 1, 2.

DIANTHUS. Pink. These are well known and much beloved by every plant grower; the alpine ones are especially commendable for the wall garden and the alpine rockery and those from the lowlands for the rock garden and the Swiss meadow. They flower generally after the spring flowers are over and some are very fragrant. They are increased by seed, cuttings, or division. They are sun loving and are easy to cultivate in any light soil. Those marked fr. are fragrant.

D. acaulis. See *frigidus.*
D. alpinus V; 8 cm.; bright pink; E. Al.; 1, 4, 6. L. (There are vars. *albiflora, carnea, grandiflora,* and *nana.*)
D. anatolicus VII; 15 cm.; rose; Or.; 1.
D. arboreus VIII; 50 cm.; carmine; Gr.; 1.*
D. arenarius VI-X; 10 cm.; white; Eur.; 1, 4. fr.
D. aridus VII; 15 cm.; yellow; Tr., Ba.; 4, 6.
D. armeria VI-X; 25 cm.; bright pink; Eur.; 1, 2, 7.
D. arvernensis V-VIII; 10 cm.; rose; Auvergne; 1, 4. fr.
D. atrorubens VII; 15 cm.; dark carmine; S. Al.; 1, 4.
D. barbatus. Sweet William. VI-X; 20 cm.; dark carmine; S. Eur.; 1.
D. biflorus VII; 20 cm.; yellowish and red; Gr.; 1.
D. Boissieri IV; 30 cm.; rose; Sp.; 1.
D. brachyanthus VI; 10 cm.; rose pink; Sp.; 4.

D. brevicaulis VII; 15 cm.; carmine; Or.; 4, 6.

D. cæsius. Cheddar Pink. VI-IX; 15 cm.; flesh rose; W. Eur., California; 1, 4. fr. (Vars. *grandiflorus* and *suavis.*)

D. calalpinus; a hybrid, *alpinus* x *callizonus.*

D. callizonus VI, 5 cm.; carmine; Tr.; 4, 6, 10. L.

D. capitatus VI; 40 cm.; bright pink; Or., Ca.; 1, 7.

D. carthusianorum V-IX; 30 cm.; bright pink; Eur.; 1, 7. (*Vars. albiflorus, carpathicus, congestus, grandiflorus, nanus, uniflorus.*)

D. caryophyllus VII; 30 cm.; rose; S. Eur.; 1, 4. fr.

D. ciliatus VII; 25 cm.; bright rose; It.; 1, 4.

D. cinnabarinus VII; 15 cm.; cinnabar red; Or.; 4, 6.

D. corsicus V-IX; 1'5 cm.; bright pink; 1, 4, 6. fr.

D. cruentus VI; 40 cm.; bright red; Or.; 1.

D. deltoides V-IX; 10 cm.; bright carmine; Eur.; 1, 4, 7. (Vars. *albus, brilliant, grandiflorus, major Sternes, splendens.*)

D. dentosus VII; 20 cm.; bright rose; Si.; 1.

D. erythrocoleus VI; 5 cm.; pink; Or.; 4.

D. fimbriatus VII; 30 cm.; rose; Ca.; 1.

D. fragrans VII; 20 cm.; rose; Ca.; 1. fr.

D. Freynii VI; 5 cm.; light pink; Ba.; 4, 6.

D. frigida (*acaulis*) VII; 5 cm.; bright pink; E. Al.; 1, 4, 6.

D. furcatus VI; 10 cm.; pale rose; S. Al.; 1, 4.

D. gallicus VI-XI; 15 cm.; carmine lilac; S. W. Eur., T.; 4. Very fr.

D. gelidus; a dwarfer *glacialis.*

D. glacialis V; 8 cm.; pink; E. Al.; 1, 6. P.

D. granaticus VII; 15 cm.; bright pink; France; 1, 4.

D. Grisebachii VI; 20 cm.; bright pink; Ba.; 1.

D. Hoeltzeri; a large flowering and dwarf *superbus;* fr.

D. Hungaricus; there are five different; one of them is a white *plumarius.*

D. Kamtschaticus. See *dentosus.*

D. Knappii VII; 30 cm.; sulphur yellow; E. Eur.; 1.

D. leptopetalus (*cretaceus*) VII; 30 cm.; pure white; Or.; 1.

D. Lereschei; a North Italian form of *cæsius.*

D. Libanotis VI; 20 cm.; light lilac; Leb.; 6.*

D. Liboschitzianus VII; 25 cm.; pure white; Or.; 1.

D. microlepis VI; 5 cm.; bright pink; E. Eur.; 4, 8.

D. monspessulanus VII-X; 20 cm.; lilac; S. Eur.; 1. fr. In the East Pyrenees this plant presents beautiful variations.

D. montanus; a dwarf form of *sinensis.*

D. Musalæ. See *rumelicus.*

D. neglectus VI; 5-10 cm.; bright carmine; S. W. Al.; 4, 6.

D. nitidus VI; 8 cm.; bright pink; Tr., Cp.; 6.

D. nivalis V; 5 cm.; bright rose; Cp.; 6, 8.

D. pallens VII; 30 cm.; whitish rose; Or.; 1.

D. petræus VI; 10 cm.; light rose; Tr., Or.; 1. fr.

D. pinifolius VII; 40 cm.; rose; Or.; 1.

D. plumarius V-X; 20 cm.; rose; Eur., Si.; 1, 4. Very fr. This is the father of the Garden or Grass Pinks whose varieties are innumerable; in the rock garden: *Allwoodii, bicolor, candidus, fl. pl., floribundus, grandiflorus, hortensis, laciniatus, lilacinus, sempeorens, suaveolens, zonatus;* there are also the Scotch Pinks, etc.

D. Pontederæ VI; 10 cm.; lilac; E. Al.; 1.

D. Prenja; a dwarf Balkan pale rose *neglectus.*

D. pyridicola VII-IX; 10 cm.; bright pink; Gr.; 4.

D. Requieni VII; 15 cm.; light rose; W. Al., Py.; 1.

D. Roysii; an English garden var. of *neglectus.*

D. rumelicus (*Musalæ*) V; 2-5 cm.; bright pink; Gr.; 1, 4.

D. rupicolus VI; 10 cm.; rose; S. Eur.; 1.

D. Seguieri VI-X; 40 cm.; carmine; S. Eur.; 1.

D. serotinus VI; 20 cm.; rose; Tr.; 1.

D. speciosus is the high alpine and Engadine form of *superbus.* fr.

D. spinosus VI-IX; 20 cm.; rose; Or.; 4, 6.

D. squarrosus VI-IX; 20 cm.; lilac; Or.; 1.

D. Sternbergii VI; 15 cm.; pink; E. Al.; 4, 6.

D. strictus VI; 20 cm.; white; Gr.; 1.

D. subacaulus VI; 8 cm.; light carmine; S. W. Al.; 1, 4. L. (A var. *pygmæa* is quite dwarf.)

D. superbus VIII-X; 50 cm.; lilac violet; Eur.; 1, 2. fr. (Different vars.: *albus, grandiflorus,* etc.)

D. sylvestris (*inodorus*) V-X; 15 cm.; bright rose; 1, 4. (Vars. *albiflorus, grandiflorus, nanus.*)

D. tenuiflorus VII; 40 cm.; rose; Ba.; 1.

D. tergestinus is a *sylvestris* with long stems.

D. vaginatus VII; 20 cm.; bright pink; S. Eur.; 4.

D. versicolor VII-X; 40 cm.; carmine; Ca.; 1.

D. virgineus (*longicaulis*) VIII; 30 cm.; pink; S. Eur.; 1, 4.

D. viscidus VIII; 10 cm.; bright pink; Gr.; 1, 4.

D. Wimmeri is a large-flowered dwarf *superbus.* fr.

D. Zonatus (*Cyclop*); a large-flowering *versicolor* x *Plumarius.* fr.

DIAPENSIA *lapponica.* A minute, shrubby, creeping plant from the arctic regions that has never succeeded well here. We tried it in the Linnæa Garden at Bourg-St.-Pierre and kept it five years, but then it died. I never heard that it has ever been acclimatised even in English countries. See *Pyxidanthera barbulata.*

DICENTRA OR DICLYTRA. The well-known Bleeding-heart (*D. spectabilis*) has been cultivated only since 1810, but is beloved all over the world. They belong to the Fumariaceæ; some have golden-yellow flowers, others bright rose or pink. All are appropriate for half-shady places, light soil, in the rock garden, in herbaceous bed or underwood. Seed (slow germ.), root cuttings, or division.

D. canadensis, Squirrel Corn, V; 25 cm.; light rose; N. Am.; 1.

D. chrysantha, Golden Eardrops, V; 60 cm.; golden yellow; Cal.; 1.

D. cucullaria, Dutchman's-Breeches, IV; 10 cm.; light rose; N. Am.; 1, 6.

D. eximia, Fringed Bleeding-heart, IV; 25 cm.; rose; N. Am.; 1.

D. formosa, Western Bleeding-heart, IV; 40 cm.; rose; N. Am.; 1.

D. ochroleuca V; 50 cm.; straw yellow; Cal.; 1, 6.

D. spectabilis, Bleeding-heart, IV; 60 cm.; bright rose; Ch., Si.; 1.

D. uniflora V; 10 cm.; white or pink; Cal.; 6.

DICHONDRA *repens.* A very creeping Convolvulad from the Southern Hemisphere which is grown for its interesting round and grey-green foliage. Very invading and carpeting.

DICTAMNUS. Gas plant. Very ornamental plants, deserving a place in every garden; they are big things, of course, but on large rockeries, on bare places, in the borders, or even isolated in the grass, they are beautiful. In the evenings of May-June, when they flower, you may have a curious spectacle by burning with a match the volatile essences that hover as a halo around the flowers that distil them. They belong to the Rutaceæ and the South and East European flora. They like a rich soil and a sunny exposure and are increased from seed (slow germ.). The type is *Dictamnus Fraxinella,* 80 cm. high, with mauve-coloured big flowers on long spikes (pure white in var. *albus*); it flowers in the early summer (June-July). *D. caucasicus* (*giganteus*) is a major form of it.

DIDISSANDRA *lanuginosa.* A beautiful cyrtandraceous plant from Yunnan, making dwarf tufts of ovate leaves, giving 5 to 7 scapes 10 cm. high with graceful dark blue flowers in clusters. It wants a rather half-damp and half-shady place in the rockery and is propagated from seed.

Diclytra. See Dicentra.

Digitalis. Foxglove. The *D. purpurea* of the woods of granitic countries in Europe is well known in gardens. Its mountain congeners are seldom seen. Some are good for rockeries, borders, or wild gardens; they are generally of tall stature and succeed on any good soil in half-shady places. Seed. (See color plate facing p. 214.)

D. ambigua (*grandiflora*) V-IX; 80 cm.; pale yellow; S. Eur.; 1. L.
D. ciliata VII; 30 cm.; yellow; Ca.; 1.
D. ferruginea VIII; 80 cm.; brown yellow; S. Eur.; 1.
D. grandiflora. See *ambigua.*
D. lævigata VIII; 80 cm.; orange yellow; Gr.; 1.
D. lanata VII; 40 cm.; yellow; S. Eur.; 1.
D. lutea VI-IX; 1 m.; yellowish; Eur.; 1, 2.
D. nervosa VI; 1 m.; yellowish; Ca.; 1.
D. obscura VII; 1 m.; yellow and brown; Sp.; 1.
D. parviflora VIII; 1 m.; light yellow; S. Eur.; 1.
D. tomentosa VIII; 50 cm.; purple; Ca.; 1.

Dioscorea *balcanica* and *caucasica* are two strong climbing Yams which were found recently in the Balkans and in the Caucasus; they have strongly nerved verticillate leaves and green flowers. They are good for the decoration of tree stems or pillars as they grow very quickly, never higher than 2-3 metres, and make very thick green masses. They succeed in any not too heavy soil and are reproduced from seed or by division. The *D.* (*Borderea*) *pyrenaica* from the high Pyrenees is a very dwarf, creeping plant with small brown inconspicuous flowers; it has a hard, relatively large tubercle not deep in the soil and grows only in the limestone débris falling from the surrounding walls; 4. Seed.

DIOTIS *candidissima.* Cottonweed. A curious creeping, intensely woolly, fluffy everlasting growing in the Mediterranean regions as well as in Western Europe, forming, on the seashore, large carpets of white foliage with yellowish inconspicuous flowers. It is hardly hardy at Floraire and we must plant it in a very sheltered border and cover it. Easy reproduction from seed, by cuttings, or division; 1, 6.*

DIPHYLLEIA *cymosa.* Umbrella Leaf. A curious Berberid growing in shady places in N. Am. where its 20-30 cm. high umbrella-shaped leaves, its white flowers, and its dark blue berries are one of the beauties of the dark underwoods. Peat and rich humus. Division or seed (slow germ.).

DIPLACUS. Tree Mimulus. One of the glories of California. Their beauty, when rising from the barren canyons, is indescribable. They sow golden bright orange colours on the landscape and add to the joy of living. I cannot tell the pleasure I had once in the neighbourhood of San Diego, driving there with a botanist friend, when I discovered the many forms and shades of Diplacus intermixed with the marvellous varieties of the Ceanothus, ranging from pure white to deep blue. No artist and no poet can reproduce or sing these "beauties." The Diplacus are often called Mimulus in gardens but differ from them in being evergreen glutinous shrubs. Jepson[7] describes six different kinds: *aridus,* pale buff to yellow; *aurantiacus,* buff or salmon colour; *Clevelandi,* golden yellow; *longiflorus,* salmon yellow; *parviflorus,* brick red; and *puniceus,* yellow, faintly shaded with red. All these were formerly the old type *glutinosus.* They represent small shrubs, 50 cm.-1 m. high, flowering from May to September, but only half hardy with us at Floraire. Therefore they want a sheltered, sunny place, peat, and it is wise to keep some in the greenhouse through the winter. In the south and west of England and the west and south of France they do splendidly. Cuttings or seed.

DISPORUM (*Prosartes*) *Hookeri.* Small Liliads 50 cm. high, with greenish flowers from N. Am.; 5, 6. Seed (slow germ.).

DODARTIA *orientalis* is a little Scrophulariad from Eastern Europe and Siberia with erect stems 30 cm.; carrying in June a terminal raceme of violet-purple flowers; sunny place and light peat. Seed or division.

DODECATHEON. Shooting Star. One of the beauties of N. W. Am. I cannot describe the splendour of the meadows I saw in the Columbia River Valley or on Mount Rainier and on the California mountains adorned by millions of Shooting Stars, which are the Primroses of the Northwestern mountains. These Primulads are sometimes called Twelvegodswort, the Primroses being under the care of the deities, and the flowers being similar to those of our Cyclamen. They like deep moist ground and half shade and are raised from seed.

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[7] Jepson, *Flowering Plants of California.*

D. acuminatus IV; 20 cm.; light rose; Missouri; 1, 2.
D. alpinum V; 25 cm.; purple and yellow; Cal.; 1.
D. Clevelandi V; 25 cm.; bright purple to white; Cal.; 1.
D. conjugans V; 25 cm.; rose and white; Cal.; 1.
D. cruciatum (*speciosum*) V; 25 cm.; red purple; N. W. Am.; 1.
D. dentatum V; 30 cm.; white and purple; R. M.; 1.
D. frigidum V; 25 cm.; rich purple; N. Am.; 6.
D. Hendersonii (*D. latifolium*) 35 cm.; purple and yellow; R. M.; 1.
D. integrifolium V; 1'0 cm.; carmine; N. Am.; 1.
D. Jeffrayi VI; 40 cm.; pink crimson and yellow; R. M.; 1.
D. mædia IV-V; 30 cm.; pale rose; N. Am.; 1. (Vars. *alba, grandiflora, splendens.*)
D. patulum V; 20 cm.; white and pink; R. M.; 1.
D. pauciflorum (*vulgare*) V; 20 cm.; pink and yellow; R. M.; 1.
D. pubescens V; 10 cm.; blue purple; N. Am.; 1.
D. redolens VI; 30 cm.; pink crimson; Cal.; 1.
D. tetrandrum VI; 20 cm.; bright lilac; R. M.; 1.

DORONICUM. Leopard's Bane. Big yellow Marguerites near to Arnica. They are easily grown plants for half-shady places and can be divided or raised from seed.

D. austriacum V; 50 cm.; bright yellow; S. and E. Al.; 1, 2.
D. carpetanum IV; 40 cm.; light yellow; Sp.; 1.
D. caucasicum V; 25 cm.; yellow; Ca., Or., It.; 1, 2.
D. Columnæ IV; 20 cm.; light yellow; It., Or.; 1.
D. corsicum V; 25 cm.; yellow; Co., It.; 1.
D. Hungaricum VI; 15 cm.; light yellow; Cp.; 1.

D. macrophyllum VII; 60 cm.; yellow; Or.; 1.
D. Orphanides VI; 60 cm.; light yellow; Gr.; 1.
D. Pardalianches IV; 30 cm.; yellow; S. Eur.; 1, 2.
D. plantagineum excelsum III-VI; 50 cm.; bright yellow; Eur.; 1.

DORYCNIUM. Graceful papilionaceous plants with white and pinkish flowers for planting on barren slopes or dry spots on the rockery. The *D. herbaceum* and *suffruticosum* from S. Eur. are the best; they can be propagated only from seed.

DOUGLASIA. See ANDROSACE.

DRABA. Whitlow-Grass. Dwarf saxatile plants with small and narrow leaves forming rosettes and yellow, white, and rarely pink or purple flowers. They are very numerous and we name here only the best for the rock garden, leaving aside the species of only botanical interest; all are easily reproduced from seed.

D. acaulis III; 2 cm.; yellow; Or.; 4, 9, 10.
D. aizoides III; 8 cm.; bright yellow; Eur.; 4. (Natural vars. *affinis, alpina, Bertoloni, bosniaca, elongata, grandiflora, Lacaitæ, Scardica,* etc.)
D. aizoon (*lasiocarpa*) III-IV; yellow; E. Al.; 4, 6.
D. algida III-IV; 10 cm.; light yellow; Si.; 4, 6.
D. alpina III; 15 cm.; yellow; Sc., A. R.; 4, 6, 10.
D. altaica IV; 15 cm.; white; Si.; 1, 4.
D. anatolica IV; 10 cm.; golden yellow; Or.; 4. 10.
D. andina III-IV; 15 cm.; white; S. Am.; 4.
D. armata III; 5 cm.; bright yellow; Ba., Tr.; 4.
D. athoa III; 5 cm.; yellow; Gr.; 4, 6, 10.
D. aurea III-IV; 15 cm.; yellow; A. R., N. Am.; 1, 4.
D. aureola III; 5 cm.; yellow; R. M. 3000 m. alt.; 4, 10.
D. australis IV; 10 cm.; white; S. Am.; 4.

D. borealis III; 10 cm.; white; A. R., N. Am.; 1, 4.
D. Breweri IV; 10 cm.; white; Cal.; 1', 4.
D. bruniæfolia. See *Olympica.*
D. bryoides IV; 10 cm.; yellow; Ca.; 4, 6, 10.
D. calycosa IV; 15 cm.; yellow; Or.; 4.
D. cantabrica IV; 10 cm.; light yellow; Sp.; 4.
D. cappadocica IV; 10 cm.; yellow; Or.; 4, 6.
D. chrysantha IV; 10 cm.; golden yellow; Cal.; 4.
D. corrugata V; 20 cm.; pale yellow; Cal.; 4.
D. corsica (*Loiseleuri*) IV; 8 cm.; yellow; Co.; 4, 6.
D. cretica IV; 5 cm.; yellow; Crete; 4.
D. cuspidata III; 10 cm.; yellow; E. Al.; 4.
D. Dedeana IV; 10 cm.; sulphur yellow; Sp.; 1, 4.
D. fladnizensis (*frigida*) IV; 10 cm.; white; It., E. Al.; 1, 4.
D. Gigas. See *Arabis carduchorum.*
D. glacialis IV; 5 cm.; golden yellow; R. M.; 4.
D. Haynaldi III; 5 cm.; yellow; E. Eur.; 4.
D. hispanica IV; 8 cm.; yellow; Sp., A.; 4.
D. Hoppeana (*Zahlbrückneri*) III; 5 cm.; yellow; Al.; 4, 6.
D. imbricata IV; 5 cm.; yellow; Ca.; 4, 6, 10.
D. Kotschyi (*Androsacea*) III; 5 cm.; white; Tr.; 4, 6.
D. nivalis III; 8 cm.; white; Sc., A. R.; 4, 6.
D. Olympica (*bruniæfolia*) IV; 10 cm.; bright yellow; Gr., Or.; 4.
D. oxycarpa IV; 5 cm.; yellow; Or.; 4, 6.
D. parnassica IV; 5 cm.; yellow; Gr.; 4.
D. (*Petrocallis*) *pyrenaica.* Rock Beauty. V; 5 cm.; purple; S. Eur.; 4; L. (A var. *albiflora.*)
D. repens IV; 8 cm.; deep yellow; Ca.; 1, 4, 6.
D. rigida (*dicranoides*) IV; 5 cm.; yellow; Or.; 4, 6.
D. Sautteri III; 10 cm.; yellow; Al.; 4, 6.
D. scabra III; 8 cm.; yellow; Ca.; 1, 4, 6.
D. tomentosa IV; 5 cm.; white; Al.; 4; L.
D. tridentata IV; 1'0 cm.; deep yellow; Ca.; 1, 4.
D. vesicaria III; 8 cm.; yellow; Lib.; 4.
D. violacea IV; 30 cm.; bright lilac; S. Am.; 1, 6.*

DRACOCEPHALUM. Dragonhead. Tufted Labiates with the flowers in terminal spikes; all are hardy things needing only good garden soil and sun; increased from seed or by division.

D. altaiense VI; 20 cm.; deep blue; Si.; 1.
D. argunense (*Japonicum*) VII; 25 cm.; blue; Si.; 1.
D. austriacum VII; 20 cm.; deep violet blue; Eur., As.; 1, 4.
D. botryoides VI; 10 cm.; rose; Or.; 1, 4.
D. bullatum VIII; 20 cm.; deep blue; Ch.; 1.
D. Forresti IX; 30 cm.; deep blue; Ch.; 1.
D. fruticulosum VII; 25 cm.; deep blue; Si.; 1.
D. grandiflorum (*imberbe*) VII; 30 cm.; deep blue; Ch.; 1.
D. heterophyllum VII; 15 m.; yellow; Tu., H.; 6.
D. Isabellæ VII; 30 cm.; deep purple blue; Ch.; 1.
D. nodiflorum VIII; 30 cm.; blue; Ch.; 1, 6.
D. nutans alpinum VII; 40 cm.; deep blue; Si.; 1.
D. peregrinum VII; 25 cm.; blue; Si.; 1.
D. Purdomi VIII; 30 cm.; deep blue; Ch.; 1.
D. Ruprechti VII; 25 cm.; blue; Tu.; 1.
D. Ruyschianum VII; 30 cm.; blue; Eur., Si.; 1.
D. speciosum VIII; 25 cm.; blue; H.; 6.
D. Tanguticum VIII; 30 cm.; light blue; Si.; 1, 6.

DRYAS. Swiss Tea. Flat dwarf evergreen shrubs carpeting the rocks in the mountains of the Northern Hemisphere. They are really one of the best creepers for rockeries, having shining, nicely dentate leaves, and their white and gold flowers are most elegant. They grow on barren slopes as well as in rich humus and on the mountains cover large spaces. After the white or yellow flowers have gone, we get the hardly less beautiful silver fluffy whorls of seeds in the same disposition as those of the alpine Anemone. They require nothing but a light soil and sunny or half-sunny exposure and are easily propagated by seed, cuttings, or layers. (See color plate facing p. 262.)

D. Drummondi VI; 10 cm.; yellow; R. M.; 1, 4.
D. integrifolia V; 5 cm.; white; B. and A. R.; 6, 8, 10.
D. lanata (*vestita*) V-XI; 10 cm.; white; E. Al.; 1, 4, 6.
D. octopetala V-IX; 10 cm.; white; Eur., As., N. Am.; 1, 4. (We found it once with very double flowers but have lost it.)
D. Sundermanni; a hybrid, *octopetala* x *Drummondi.*
D. tenella IV-V; 5 cm.; white; Ar., R.; 1, 4, 6.

DRYPIS *spinosa.* An interesting thorny-leaved Caryophyllad with vivid glossy green foliage and white flowers coming from S. E. Eur. and flowering July to September. Seed or cuttings.

DUCHESNEA. See FRAGARIA *indica.*

DUDLEYA. See COTYLEDON.

ECHEVERIA *amœna* from Mexico is the one Echeveria hardy with us; it is a dense Crassulad with fleshy rose-green leaves and red and yellow flowers which does well on a drained, sheltered place at the foot of a wall or of a rockery.

ECHIUM. See LITHOSPERMUM *petræum.*

EDELWEISS. See LEONTOPODIUM.

EDRAYANTHUS or rather HEDRAYANTHUS. These Campanulads, often called Wahlenbergia, are essentially rock plants and belong to the South European mountains. Easily grown in rock or wall fissures and on rockeries but all like sun and well-drained ground; easily propagated by seed.[8]

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[8] There is great synonymy in Edrayanthus and many of the kinds listed in catalogues are nothing but repetitions. See the *Monograph* of this genus, by E. Janchen, Wien, 1910.

E. alboviolaceus VI; 5 cm.; light lilac; E. Eur.; 4.

E. bosniacus, caricinus, croaticus, and *Kitaibelii.* See *graminifolius.*

E. dalmaticus (*caudatus*) VI; 10 cm.; bright lilac; E. Eur.; 1, 4.

E. dinaricus (*pumiliorum*) VI; 5 cm.; lilac; Dalmatia; 4.

E. Ginzbergeri VI; 8 cm.; violet; Dalmatia, Montenegro; 4.

E. graminifolius VI-VII; 15 cm.; violet blue; It., Gr.; 1, 4.

E. hercegovinus VI; 10 cm.; bright lilac; Herzegovina; 4.

E. niveus; a white flowering *graminifolius* from Bosnia.

E. pumilio VI; 8 cm.; lilac; Dalmatia; 4, 10.

E. serpyllifolius VI; 5 cm.; dark purple; Ba.; 4, 6, 10. (Var. *major* with big flowers.)

E. tenuifolius VI; 15 cm.; lilac; Ba., E. A.; 4, 6, 8.

E. Wettsteinii VI; 10 cm.; violet blue; Montenegro; 4.

EMPETRUM *nigrum.* Crowberry. A dwarf creeping evergreen Heath-like shrub not exceeding 10 cm.; the flowers are not showy, but the berries are black and shining, and the general appearance of the plant is interesting; it lives on the high mountains of Europe and Asia and in boreal regions. *E. album* (*Corema alba*) with white berries is Portuguese and *E. rubrum* with red berries comes from the South Andes. *E. scotticum* is a British form of *nigrum.* They all like a peaty, moorish soil and a moist situation in the rockery or in the bog. Propagated by seed (slow germ.), cuttings, or division.

EOMECON *chionantha.* Poppy of the Dawn. A bog and peat plant from China, very troublesome when established, as it runs about like a pest; its leaves are very fine, glabrous and pale green; the flowers are white with numerous golden stamens; flowering time from May to October. Propagated by runners or seed.*

EPHEDRA. Joint Fir. Gnetaceous, near to the Conifers and very similar to the Horsetails. Their flowers are green, but the numerous coral red berries, recalling those of the Yew, are of real beauty. They are all very enduring and hardy and they can be planted on dry walls, barren slopes, and rocky corners with a certainty of success if they only have sun enough. Moreover, these curious beings are desert plants "par excellence" and drink in sun heat like other plants drink water. The following species are grown in gardens: *alata* (40 cm.) from Arabia; *altissima* (climbing) from N. Africa; *andina* (50 cm.) from S. America; *distachya* (30 cm.) from desert countries of E. Eur. and Asia; *fragilis* (40 cm.) from same countries; *Helvetica* (20 cm.) a Swiss child; *monostachya* (40 cm.) from Asia; *nevadensis* (1 m.) from N. Am.; *Sikkimensis* (50 cm.) from the Himalayas; *viridis,* Mexican Tea (60 cm.), from Mexico. Propagated by seed or runners.

EPIGÆA *repens.* Mayflower, Ground-Ivy. This is one of the most popular plants in Northeastern America but I cannot say I participate in this enthusiasm. I recognise its sweet fragrance and once in the streets of Boston I bought some bunches in the spring. It has a small, light pink waxy star flower in small clusters emerging from ample oval hard leaves and in the woods of New England forms large creeping masses of evergreen foliage. But this plant is rebel to any culture here, even in pure peat, even watered with rain water; when sown it germinates and then dies suddenly. The Japanese one, *E. asiatica,* with bright rose flowers and longer leaves, 5-8 cm. high, is as rebel to our culture as the American one. Both are lime-haters and want acid soil and shady underwood.

Epilobium. Willowweed. These plants belong to the same family as the Fuchsias but are of very different aspect. They are herbs either big with invading runners or dwarf carpeting, covering the soil rapidly. Some of them, *E. latifolium, E. obcordatum,* are dear little things of great beauty. Epilobium is part of the whole world's mountain flora; the dwarfest ones are New Zealanders while the big *E. angustifolium,* of the group Chamænerium, is common to all the mountains of the Northern Hemisphere. They generally prefer cool, moist, and half-shady places and are propagated by runners or from seed. *E. angustifolium* is used in the London parks for summer decorations. The white form is exceedingly good when mixed with the type, but both are troublesome invading plants whose runners kill any tender plants. However, when planted in colonies they form a real picture.

E. alpinum IV; 8 cm.; carmine; Al., R. M.; 4, 6, 10.

E. angustifolium (*spicatum*) V-IX; bright carmine; Eur., Si., N. Am.; 1, 2. (The var. *album* is pure white.)

E. Dodonæi (*Fleischeri*) VII; 25 cm.; carmine and rose; Al., Py.; 4.

E. hirsutum VI-IX; 1 m.; light carmine; Eur.; 1, 3.

E. latifolium VI; 10 cm.; bright rose; R. M., A. R.; 4, 6, 10. **P.**

E. luteum VII; 15 cm.; sulphur yellow; N. Am.; 8, 10. P.

E. obcordatum V-VII; 10 cm.; bright rose; N. Am.; 6, 8, 10.*

E. rosmarinifolium IV-X; 60 cm.; carmine rose; Eur.; 1. L.

Epilobium brevipes, glabellum, Hectori, linnæoides, macropus, melanocaulon, nummulariæfolium, pedunculare, and *pubens,* creeping New Zealanders, are very dwarf plants carpeting the soil; nice small leaves and pink or whitish flowers on slender stalks.

EPIMEDIUM. Barren-Wort. Interesting and elegant Berberids with most decorative foliage; the flowers are disposed on spikes or in clusters, very fine but fugitive. The leaves of the evergreen kinds (*pinnatum* and *ochroleucum*) are extremely beautiful and largely used for winter decorations. All are very hardy and form wide masses of green in shady places of the rockery; for woodlands they are priceless, as they prosper in the worst places and become, with time, quite naturalised when on suitable rich leaf mould. They seldom seed and are to be propagated by division.

E. alpinum V; 25 cm.; reddish pink; S. Eur., Or.; 1, 2. (An Oriental var. *pubigerum,* with larger red flowers.)

E. diphyllum, Aceranthus dip., V; 15 cm.; pure white; Jap.; 1, 2.

E. (*Vancouveria*) *hexandrum* IV; 25 cm.; white; N. Am.; 1, 2.

E. lilacinum V; 30 cm.; lilac; Jap.; 1, 2.

E. macranthum V; 20 cm.; white; Jap.; 1, 2.

E. niveus V; 8 cm.; white; Jap.; 1, 2.

E. ochroleucum; a pale var. of *pinnatum.*

E. pinnatum (*colchicum*) IV-V; 30 cm.; bright yellow; Or.; 1, 2.

E. rubrum (*coccineum*) IV; 30 cm.; bright red; Jap.; 1, 2.
E. versicolor (*discolor*) V; 25 cm.; pink and yellow; Jap.; 1, 2.
E. violaceum; a beautiful Japanese purple var. of *macranthum.*

ERANTHIS *cilicica* (Oriental), *hyemalis* (European) and *Tubergeni* (a garden variety with larger flowers) are the Winter Aconites of the English, and have a certain importance for winter decoration of gardens. They are small tuberous Ranunculads, with short-lived growths; the yellow flowers come early in February and adorn the woodlands, meadows, borders, or rockeries; by May everything is over and you see nothing more. Propagation from seed (slow germ.).

ERICA. Heath. Grown in gardens for ages and the South African ones captivated amateurs in the last century. They generally are peat plants. For rockeries we have a dozen good things which grow easily in sunny places and sandy peat. Propagated by seed, layers, cuttings, or division. Almost all these Heaths have white-flowering vars. and dwarf forms.

E. arborea III; 1 m.; white; S. Eur.; 1. P.*
E. carnea, Winter Heath, XII-IV; 20 cm.; bright rose; S. Eur.; 1. (A good var. *alba* with pure white flowers.)
E. ciliaris VII-IX; 30 cm.; carmine; S. W. Eur.; 1, 5. P.
E. cinerea VII-X; 30 cm.; lilac violet; 1, 5. P.
E. mediterranea II-V; 80 cm.; bright rose; S. W. Eur.; 1, 5.
E. multiflora VII-XI; 40 cm.; rose; S. Eur.; 1.
E. scoparia V; 1 m.; white green; S. Eur.; 1, 5; P.*
E. stricta (*corsica*) VII-IX; 80 cm.; pink; Co., It., Sp.; 1, 4.
E. tetralix VI; 25 cm.; bright pink; Eur.; 1, 5. P.

E. vagans VI-IX; 60 cm.; rose; S. W. Eur.; 1, 5. P.
E. (Calluna) vulgaris VIII-X; 30 cm.; lilac; Eur.; 5. P.

ERIGERON. Fleabane. These Composites are near to Aster; they have narrow purple or rose rays in double rows, while the Asters have them broader and in a single row. They are good strong plants, easy to grow and to reproduce either from seed or by division. They ask only well-drained garden soil and sunny or half-sunny situation.

E. alpinus V-VII; 10 cm.; lilac; Eur., Si.; 1, 6.
E. aurantiacus VI; 20 cm.; bright orange; Or., Tu.; 1, 6.
E. aureus V-VII; 12 cm.; golden yellow; R. M.; 1, 6.
E. caucasicus V-VI; 10 cm.; purple lilac; Ca.; 1.
E. compositus V-IX; 5 cm.; white; R. M.; 1, 6.
E. Coulteri VII; 20 cm.; violet; R. M.; 1.
E. elatior VII; 30 cm.; purple; R. M.; 1.
E. flagellaris V-IX; 5 cm.; light rose; R. M.; 1, 4.
E. glabellus V-IX; 15 cm.; bright lilac; N. Am.; 1, 7.
E. glaucus VII; 30 cm.; lilac; R. M., S. Am.; 1.
E. leiomerus V; 5 cm.; lilac blue; R. M.; 1, 6.
E. luteus VI; 10 cm.; light yellow; N. Am.; 1, 6.
E. macranthus V; 60 cm.; bright lilac; N. Am.; 1.
E. mucronatus. See *Vittadenia triloba.*
E. philadelphicus V-XI; 60 cm.; flesh rose; N. Am.; 1, 2.
E. pulchellus VI; 10 cm.; purple; Ca., Si.; 1.
E. radicatus V-VIII; 15 cm.; lavender blue; R. M.; 1.
E. salsuginosus VI; 40 cm.; pale lilac; R. M.; 1.
E. speciosus VII-X; 50 cm.; bright lilac; R. M.; 1.
E. trifidus VII; 10 cm.; white; R. M.; 1.
E. uniflorus V-IX; 5 cm.; pale lilac; Al.; 8, 10.
E. Villarsii VI; 25 cm.; violet; Al.; 1, 6.

ERINACEA *pungens.* Hedgehog Broom. This is a dense, pungent bush, which the Spanish derisively call "Lady's Cushion." It grows in the deep crevices of the hardest rocks and sunny walls in the mountains of Spain, where it forms large patches of dark green foliage. In April these cushions are covered with lavender-blue flowers in the same manner as *Genista horrida* which haunts the rocks higher above it and colours the landscape with gold while the Purple Broom (Erinacea) brings lavender to the picture. It wants a very sunny and dry situation on the rockery and flowers with us from April to the end of May. Propagated by cuttings and from seed.

ERINUS. Liver Balsam. Pretty dwarf plants growing between the rocks of S. Eur. and well suited for the rockery, the walk, and wall garden. They only want a sunny or half-sunny fissure and are easily reproduced from seed. The type is *E. alpinus,* 5-8 cm. high, with a profusion of light carmine flowers from V to VII and glabrous foliage; *E. hirsutus* from the Pyrenees which is hirsute, glandulous, and has deeper coloured flowers; its var. *hispanicus* has brilliant crimson flowers; *E. roseus* is a light rose *alpinus,* and *hirsutissimus* is the hairiest form of all. Both *alpinus* and *hirsutus* have albino forms with pure white flowers.

ERIOGONUM. Curious North American plants, considered formerly as Umbellifers and now placed in the Polygonaceæ, with more or less downy foliage, generally carpeting and prostrate. Their great interest for us is that they flower late in the season and are good for adorning the hot and arid slopes of rockeries from June to October. Propagated by division, layers, or seed. They are numerous in the deserts of Northwestern America and the *Flora of California* describes 65 different species, some of them being annuals and, of course, of no value for us. I wondered, in the spring of 1926, at the different forms of Eriogonum carpeting the dry and sterile slopes of the Pacific Coast. They live there on nothing, and stand the hardest and longest droughts.

E. alpinum VIII; 5 cm.; yellow; Cal.; 4.
E. androsaceum VII; 10 cm.; yellow; R. M.; 1, 4.
E. arborescens VIII-X; 30 cm.; rose; Cal.; 1.
E. cæspitosum VII; 20 cm.; yellow; R. M.; 1, 4.
E. campanulatum VIII-XI; 20 cm.; whitish; R. M.; 1.
E. compositum VII-XI; 30 cm.; cream yellow; R. M.; 1.
E. flavum VI-IX; 20 cm.; bright yellow; R. M.; 1, 4.
E. incanum VII; 5 cm.; yellow; R. M.; 4.
E. Lobbii VII-IX; 30 cm.; white; Cal.; 1.
E. marifolium VII; 25 cm.; yellowish; Cal.; 1.
E. nivale VIII; 5 cm.; red; Cal.; 4.
E. ovalifolium VII; 10 cm.; white; Cal.; 1, 4; P.
E. racemosum VIII; 30 cm.; reddish; R. M.; 1, 4.
E. umbellatum VI-X; 20 cm.; sulphur yellow; R. M.; 1, 4.

ERIOGYNA *pectinata*. See SPIRÆA.

ERIOPHORUM. Cotton-Grass. These cyperaceous plants belong to the vegetation of the marshes and bogs; they are strongly stoloniferous and cover large spaces, especially on mountain damp places where their nice white flakes are one of the beauties of the country. Some have only one flake (*E. alpinum,* a very small one; *E. Scheuchzeri* and

E. vaginatum); others have several (*E. angustifolium, E. gracile, E. latifolium*). They must be confined in the bog garden or near the water.

ERIOPHYLLUM *cæspitosum, confertiflorum,* and *lanatum* are bright yellow Composites from North America with greyish foliage, and cæspitose growth for sunny places. They grow on rocks near the Pacific Coast, where they brighten the landscape. I saw them beautifully adorning barren places in the Mohave Desert. In our gardens they only want sun and a dry situation and can be divided or sown with ease. They can grow in the poorest soils and seem to be more brilliant in such a place.

ERITRICHIUM *nanum* (*terglouense*). King of the Alps. This is not a real alpine, as it is found all over the high mountains of the Northern Hemisphere. It is the gem of all the high alpine treasures but, alas, how difficult of cultivation! The plant as seen on the high cliffs of our Alps is a dwarf Forget-me-not of cærulean blue, the flowers almost destitute of stem, and sessile, covering the dense tuft of villose leaves in such a manner that the foliage is hardly visible through the azure veil. The plant grows only on the high passes or on rocks (lime or granite) above 2500 m. altitude, and there it covers large areas mixed with the *Androsace glacialis, Gentiana imbricata,* and *brachyphylla, Potentilla frigida, Saxifraga aphylla, oppositifolia, bryoides, Geum reptans, Phyteuma pauciflorum,* etc. In the Maritime Alps it is stronger and forms larger and looser tufts with bigger flowers. The plant, or some very nearly allied sisters, can be found on the Himalayas, over the high Persian peaks, and in Northwestern America. I have in my herbarium some specimens gathered in the Yellowstone Mountains, some from the Colorado Rockies, and friends in Seattle showed me some found on Mount Rainier. The culture of that pearl is possible in England when grown as a biennial and sown in the autumn, then pricked into a pan and kept under glass. Some friends of mine in Yorkshire, in Sussex, and elsewhere showed nice pans covered with flowers. Some amateurs keep it on the moraine and some have it sowing itself around the parent plant. It must have a well-drained spot on the rockery, if possible watered from below and covered with a glass in the rainy season and all the winter through. Sun, as much wind as possible, and through the winter a very dry position. It does relatively well on our tufa wall.[9]

ERODIUM. Heron Bills. Geraniums with a thick rootstock, aromatic foliage, divided or entire, belonging to the Xerophile flora of the sunny countries in Europe and the Orient. They are generally saxatile plants, growing on rocks, generally on lime, and flowering for several months. Boissier published a long list of these in his *Flora Orientalis* or in *Les Plantes d'Espagne.* They hybridise with the greatest facility, so to keep the seed pure it is necessary to grow the species far from one another. They generally like sun, rocks, wall, and they fear the moisture. Propagated from cuttings and seed. In some parts of the East Pyrenees (Val Ilõ for instance) *Erodium macradenum* covers all the rocks on the sunniest possible places and forms large masses of grey foliage. In Spain, the native kinds there do the same.

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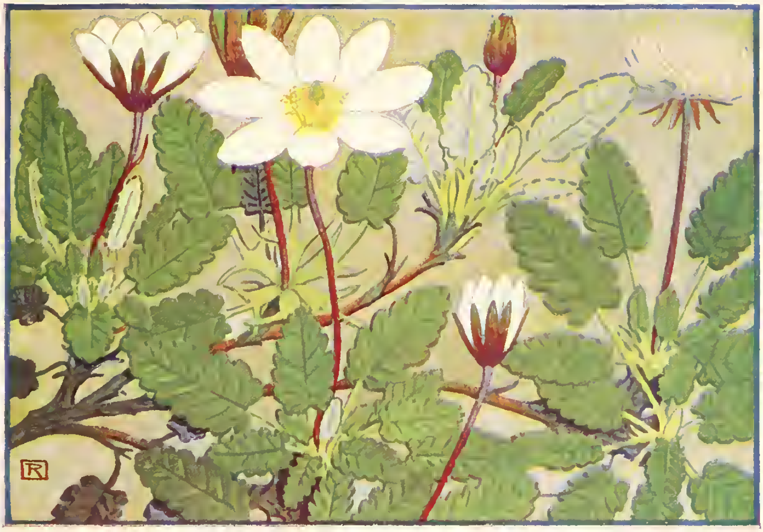
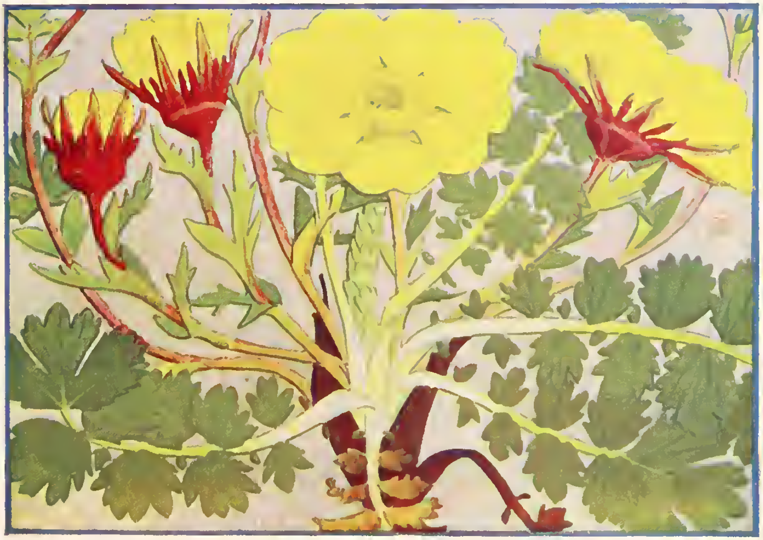
[9] Of *Eritrichium nanum* a writer in the *Gardeners' Chronicle*, 11 June, 1904, p. 374, says: "Many of the small islands of Nova Zembla are almost covered with myriads of this plant which there flourishes within a few feet of sea-level. So far, however, from being free from damp, the soil appeared to be absolutely saturated, a stony bog, so to speak, consisting of disintegrated rock with innumerable fragments retaining the moisture which would probably not be stagnant."

E. absinthoides (*Sibthorpianum*) V-X; 10 cm.; rose lilac; Gr.; 1, 4.
E. alpinum VI; 5 cm.; lilac violet; Ab., It.; 4.
E. amanum VII; 15 cm.; white; Or.; 1, 4.
E. asplenioides VII; 20 cm.; violet; Atl., Sp.; 1.
E. cedrorum (*Kotschyanum*) VI; 20 cm.; purple; Or.; 4, 6.
E. chamædryoides (*Reichardi*) V-IX; 5 cm.; white; Co.; 4.
E. cheilanthifolium (*trichomanæfolium*) VI; 20 cm.; bright lilac; Sp.; 4.
E. chrysanthum VII-IX; 15 cm.; sulphur yellow; Gr.; 4, 6.
E. corsicum V-IX; 8 cm.; rose; Co.; 4, 6.
E. Crispii; a hybrid *chrysanthum* x *absinthoides* (Floraire).
E. daucoides (*carvifolium*) VII-XI; 20 cm.; bright carmine; Sp.; 1, 4.
E. Giucciardi VI-IX; 40 cm.; pink; Gr.; 1, 4, 6.
E. guttatum VI; 15 cm.; pinkish white; S. Eur.; 4.
E. hymenodes VI-X; 40 cm.; rose and white; Atl.; 1.
E. leucanthum VII; 1·5 cm.; white; Or.; 4.
E. macradenum (*glandulosum*) VI-X; 20 cm.; white and brown; Py., Sp.; 4, 6.
E. Manescavi VI-IX; 30 cm.; bright carmine; Py.; 1, 2.
E. pelargoniifolium VI-X; 30 cm.; light rose; Or.; 1.



Dryas octopetala



Geum reptans

E. petræum VII; 15 cm.; carmine; S. Eur.; 4, 6; L.
E. Romanum (The Colisée Plant) V-X; 25 cm.; bright carmine; S. Eur.; 1.
E. rupicola V-X; 15 cm.; light rose; Sp.; 4.
E. supracanum VII; 15 cm.; light rose; Sp.; 4, 6.

ERPETION *reniforme* is the New Zealand Viola, with blue and white flowers and orbicular leaves; not quite hardy here.

ERYNGIUM. Blue Thistle. This genus of Umbellifers is very extensive, extremely ornamental, and in some cases has even architectural beauty. We disregard the different American bromelia-leaved kinds, which are too big and too tender for our purposes considering only the Old World species which have involucres and stems that become lilac blue, then violet- or amethyst-coloured at flowering time. The alpine and mountain kinds are one of the beauties of the Alps and the Pyrenees. If you would have any idea of the marvellous sight their masses produce, go to the East Pyrenees, at the base of the Val d'Eyne, for instance, and admire the marvel: myriads of *Eryngium Bourgati* stems, bluish pink (the colour of *Omphalodes Luciliæ* flowers), arising from the stony ground enlightening the whole country with their sky-blue stiff and yet graceful candelabras 20-50 cm. high according to the quality of the ground—much better in the poor soil—always facing the hardest sun. This is one of the grandest spectacles I ever saw. Nothing can give an idea of the picture and nothing equals it in our mountains. The alpine species is bigger, nobler, perhaps, but has not the same charming pink-azure tint. It has stiff, 80 cm. high stems, branched upward, green at first and then, as blooming time approaches, becoming more and more blue till the whole becomes dark amethyst; the cup (involucre) which surrounds the flowerhead is the most developed of all (sometimes 12 cm. diameter) and very thin. Here is a description given by Farrer, the enthusiastic poet, in plant description:

"In the unsurpassable *E. alpinum* the frill is double, treble, quadruple, and each bract is toothed again and again into long thorny-looking spines of its own, until the whole effect is that of a blue lacy collar of richness unparalleled."

E. alpinum is very decorative and we have taken it as the decoration motif for our chalet at Floraire. It is one of the flowers used in ceramic and in industrial arts in Switzerland.

Each chain of mountain, at least in South Europe and the Orient, has its own Eryngium. Our Alps have *E. alpinum;* the Pyrenees have *E. Bourgati;* the Spanish Sierras, *E. glacialis;* the Atlas, *E. planum;* the Oriental Alps, *E. amethystinum;* the Caucasus, *E. giganteum;* the Apennines, *E. cæruleum;* Crete, *E. creticum;* the Maritime and Dauphiné Alps, *E. spinalba;* while the seacoasts of Europe and the Orient have the marvellous *E. maritimum* the colouring and tints of which closely recall *E. Bourgati.* All these Eryngiums like deep soil; *maritimum* sends its main root one to two metres deep in the sand; *alpinum,* growing in rich limy soil between 1200 and 2000 m. altitude in the Alps, likes better ground, while *Bourgati* is the best in poor, meagre, stony, very sunny, but still deep soil. They can be reproduced from root cuttings or seed (slow germinating when old, but coming up at once when sown immediately after the harvest). They can never be divided and do not like to be moved when once established. The mark † indicates kinds suitable for naturalising on sterile slopes.

E. alpinum, Alpine Blue Thistle, VI-VII; 1 m.; blue; Al.; 1.
E. amethystinum VI-IX; 60 cm.; violet blue; Al., Or., Tr.; 1.
E. Bourgati VI-IX; 40 cm.; lilac azure; Py.; 1.†
E. cœruleum VII-XI; 80 cm.; deep blue; Ca., It., Or.; 1.†
E. Florariensis; a hybrid, *giganteum* x *alpinum.*
E. giganteum VII-XI; 80 cm.; greyish blue; Ca., Or.; 1.†
E. glaciale VII; 10 cm.; blue; Sp.; 4, 8, 10.
E. maritimum VII-X; 40 cm.; blue violet; Eur., As., Or.; 1.
E. multifidum VIII; 80 cm.; bluish; It., Gr.; 1.
E. Oliverianum; a hybrid, *giganteum* x *planum.*
E. planum VII-XI; 80 cm.; lead greyish blue; At., Or., Si.; 1.†
E. serbicum VII-IX; 50 cm.; deep blue; Ba., E. Al.; 1.
E. spinalba VIII-X; 40 cm.; bluish silver grey; W. Al.; 1.†

Mr. Arends has distributed the hybrids "Juwel" and "Violetta."

ERYSIMUM. Blister Cress. These are Crucifers, and some of them are brilliant and good, but a large number are worthless "cabbage seedlings." We consider only those suitable for the rock garden. All want well-drained ground or a deep crevice in a wall, and can be reproduced easily from seed or from cuttings.

E. aciphyllum V; 1·5 cm.; yellow; Gr., Or.; 4.
E. Allionii. See *E. Perowskyanum.*
E. Aucheri V; 10 cm.; yellow; Or.; 4.
E. cæspitosum VI; 10 cm.; yellow; Or.; 1, 4.
E. canescens V; 15 cm.; yellow; S. Eur.; 4.
E. Helveticum VI; 20 cm.; yellow; Al., Ca.; 1, 4.
E. Kotschyanum VII; 5 cm.; bright yellow; Or.; 4.
E. linifolium VI-IX; 25 cm.; lilac; Portugal; 1, 4.
E. mutabile VI; 10 cm.; yellow to purple; Crete; 4.
E. ochroleucum V; 20 cm.; pale yellow; Eur.; 1, 4.
E. pachycarpum IV-VI; 20 cm.; orange yellow; H.; 1, 4.
E. Perowskyanum (*Cheiranthus Allionii*); a hybrid with bright orange flowers; biennial.
E. pulchellum V-VII; 15 cm.; bright yellow; Or.; 1, 4, 7.
E. pumilum VI; 5 cm.; bright yellow; Al.; 4, 6.
E. purpureum VI; 20 cm.; purple violet; Lib.; 1, 4, 6.

ERYTHRÆA. Centaurium. Late-flowering Gentians with small massed flowers disposed in umbels or heads. The delicate, bright, waxy, rose-pink stars are one of the beauties of the autumn. None is very enduring. *E. Centaurium* is an old and popular remedy against fever and is gathered in large quantities for the drug trade. It is a biennial, as also are *E. chloodes, elodes, grandiflora, littoralis, pulchella, ramosissima,* and *tenuifolia.* The delicate *E. Massonii* (*diffusa*) of W. Eur. is perhaps perennial; at least in Floraire it seems to be so. It wants peat soil in an open corner. When in California, I saw from the railway a marvel called *E. venusta,* 60-80 cm. high, looking like a shrub, with large, bright, rose-pink flowers. I got off at the next station and returned to the place where I saw the plant. Alas, it was a biennial! But what a beauty! All these Erythræas are acid-soil and sun-liking plants, and are easily reproduced from seed.

ERYTHRONIUM. Dog's Tooth Violet. Trout-Lily. Adder's Tongue. This genus is indeed among the gems of the Liliaceæ. In our region (on the French Jura especially) the *E. dens-canis* grows by myriads in the woodlands and covers the soil in March-April with its beautiful large bright carmine flowers (seldom pure white), resembling a Cyclamen with recurved petals. The leaves are maculated, bright green and brown. In Northwest America I was fortunate enough to meet the sisters of our *E. dens-canis* growing in broad meadows in the alpine or mountain zones of Oregon, Washington, and California, milliards of plants together, the species growing together and the whole forming the outstanding feature of the spring flora. *E. grandiflorum,* Avalanche-Lily, with its yellow and white flowers, covers large spaces; *E. albidum,* whitish; *americanum,* yellow; *bracteatum,* yellow; *citrinum,* lemon yellow; *Hartwegii,* cream and orange yellow; *Hendersonii,* purple; *montanum,* white; *parviflorum,* bright yellow; and *revolutum,* bright pink or lavender, are all beautiful and well suited to rockery, meadow, or woodland. They all come easily from seed (slow germ.). All are Northwest American. In Europe we have only the beautiful *E. dens-canis,* which reaches into the Orient and North Sibèria (var. *sibirica*). In Italy the flowers are whitish rose, while, in our limestone ground, they are of the highest carmine. A good deep leaf mould in a half-shady place suits them the best.

ESCHSCHOLTZIA. Who would give such a barbaric name to such a radiant beauty? If you write Escholtzia you are wrong; it's Eschscholtzia; what a relief to know that we may be understood by calling it California Poppy. This glory of California is not just what we would strictly consider as a rock plant, since it grows all along the railway slopes, on sandy ground, and on the seashores. But I saw some in the Mohave Desert growing between the stones and they were very luxuriant there. I know that generally they are not considered to be perennials, but we have some plants in pots which are three years old and, finally, they are such a precious resource for the summer and autumn days, when the rockeries are dull and poor looking, that I consider the California Poppy is a good friend of the rock gardener. The golden or orange-coloured cups are one of the joys of my life and I cannot recommend them too strongly to people who love bright colours. Seed may be sown in spring, but better in the fall; they like sun and a deep sandy soil. (VII-XI.)

EUPHORBIA. Spurge. A vast family of poisonous herbs or shrubs, some of which find a place on the rockery or in barren corners, as they are rather frugal and resistant. Their flowers are insignificant but are accompanied by bracts often conspicuously coloured, generally yellow-greenish, and so can be used to make a good decorative effect; the foliage is generally glaucous and pretty. Here is a list of the best and most interesting. They all want rather sheltered and very sunny places on the rockery. Propagate by seed.

E. altissima; 2-3 m. high; Or.; 1.
E. biglandulosa (*rigida*); S. Eur., marvellous in its forms and effect; 25-40 cm.
E. capitulata; dwarf Oriental; 5-10 cm.; cult. 4.
E. Characias; S. Eur.; 60 cm.*
E. Dendroides; 60 cm.; S. Eur.
E. Herniariæfolia; dwarf, creeping, Or.
E. Kotschyana; 1 m. high; Or.
E. Myrsinites; one of the best rampant plants with thick, dense, foliate branches; glaucous; bluish; very ornamental.
E. polychroma; with rich yellow bracts.
E. pilosa; similar to above.
E. spinosa; dwarf shrub; S. Eur.*
E. Wulfeni; a huge, tropical-looking plant.

EVONYMUS (Euonymus) *pygmæus,* or *Kewensis,* from Japan, is a minute *E. filiformis* with very small crenate leaves on creeping stems hardly a centimetre high but sometimes very long, and carpeting the soil.

FALCARIA *latifolia, Rivini,* and *scioides* are three invading Umbellifers with ornamental foliage and small white Bindweed-like flowers.

FARSETIA *clypeolata, eriocarpa,* and *lunarioides* are three yellow-flowered Crucifers, half perennial; they like sun and can be used for barren, gravelly, or light ground where they reproduce themselves with great rapidity. *F. triquetra,* an E. European plant, has white flowers and forms a dense, whitish-leaved, saxatile plant; good for sunny walls or rockery. Seed or cuttings.

FELICIA. See AGATHEA.

FERULA *communis* and *glauca*. Giant Fennel. Gigantic Umbellifers from South and East Eur. with elegant very thin foliage and flower-stems often two metres high bearing umbels of yellow flowers. Deep ground and half sunny, sheltered places. Seed (slow germ.).

FICARIA *ranunculoides* (*Ranunculus Ficaria*). Celandine. A tuberous Buttercup, appearing as a weed in the damp and fertile soils, and flowering very early in spring. Some good varieties exist, such as *fl. pl., albiflora,* and *grandiflora,* which may be planted in open, exposed corners of the rockery.

FRAGARIA. Strawberry. The European species are well known in gardens: *alpina, collina, elatior, vesca,* and their varieties; also *grandiflora, monophylla, roseiflora,* and *semperflorens.* The Himalayas give us the yellow-flowering Strawberry, *F. indica,* with an attractive-looking but insipid fruit; it is a very sarmentose and invading plant but useful for carpeting large areas in sheltered places. From America we have several large-leaved species: *Californica, chilænsis, Hagenbeckiana,* and *lucida.* The Himalayas also gave us *F. Daltoniana* and *Nilgerrensis.* All are easy growing things which can be propagated from seed or by division.

FRANCOA; a Tufted Saxifrage, not quite hardy here; South American plants, with large leaves and pinkish flowers in broad spikes. Three kinds are cultivated: *F. appendiculata, ramosa,* and *sonchifolia;* light soil, half sunny, sheltered corner. Propagation from seed.

FRANKENIA *lævis* and *pulverulenta.* Sea Heath. Little carpeting plants covering the soil along the seacoasts in S. and W. Eur., with very thin leaves and little pink flowers. They want a sheltered, very sunny, exposed spot on the rockery and are increased by division, cuttings, or from seed.

FRASERA *speciosa* is a North American Gentian, near to Swertia, with oval leaves and whitish flowers on erect stems; peat and damp. Prop. from seed.

FRITILLARIA. Fritillary. An interesting group of the Liliaceæ whose drooping bellflowers are isolated or grouped in whorls (as in *F. Imperialis,* the Crown Imperial). They are generally found in open meadows in the mountain zone and are easily grown in light soil or leaf mould. Prop. from seed (slow germ.).

The type *F. Meleagris,* Snake's Head, is well known in gardens; it is a West European kind with white tessellated purple and violet flowers (sometimes pure white), which we grow in damp places in the meadows. The number of Fritillarias introduced from Asia, North America, and the

Mediterranean regions has been increasing every year and we have now in gardens more than 50 different kinds of them. The best and easiest to grow are: *F. acmopetala,* deep brown; *aurea,* bright yellow; *Burnati,* yellowish; *Caussolensis,* brown and greenish yellow; *citrina,* lemon yellow; *delphinensis,* brownish violet; *græca,* brownish; *Kamtschakænsis,* dark brown; *lanceolata,* purple mottled with greenish; *latifolia,* reddish; *libanotica,* a very tall one, lilac; *lutea,* yellow; *messanensis,* dark purple; *minor,* brown; *Moggridgei,* a beauty, gold and lemon yellow; *montana,* violet; *oranensis,* yellowish; *pallidiflora,* greenish; *persica,* big, with dark brown flowers; *pontica,* greenish; *pudica,* yellow; *pyrenaica,* dark brown and greenish; *recurva,* vermillion; *ruthenica,* brownish violet; *Sewerzowi,* brownish; *tenella,* dark brown; *tristis,* dark brown; *tulipifolia,* greenish; *Walujewi,* whitish mauve.

FUCHSIA. A few species may be planted in the rock garden in sheltered places. Best of all is the very low *F. pumila,* 10-15 cm. high, with numerous scarlet flowers (VI-IX); *F. gracilis* is taller, attaining one metre, but how graceful and blessing with its numerous scarlet and purple nodding flowers! *F. Riccartonii* is a robust shrub which is half hardy in our country and much appreciated in England, where it is quite hardy.

FUMANA. Dwarf and very thinly foliated yellow Helianthemums from South Europe; they like dry and sunny places.

FUNKIA (Hosta). Japanese Hemerocallis. Valuable large-leaved Liliaceæ, growing well in shady places and the best plants for the centre of a large city like London. They can be used for big, shady rockeries or north borders, etc.

GAGEA. Small yellow-flowering Lilies with little bulbs and narrow leaves growing in open situations on loose soil. *G. Liotardi* is an alpine, bright yellow, 8 cm. high Lily; *G. lutea,* greenish yellow, grows in the fields of Europe, while *G. saxatilis* is a minute plant haunting sunny, exposed rocks in South Europe. Seed (slow germ.).

GALANTHUS. Snowdrop. The type, *G. nivalis,* is a European species worth growing in the grass of open meadows or in the wild garden. There are numerous varieties or relatives, but all have the same general aspect. The flowering time varies from late autumn with *G. octobrensis* to the end of April with *G. caucasicus* and some Oriental kinds. *G. Elwesi* is very early and *G. Fosteri, plicatus,* and *maximus* have big flowers. Some catalogues offer more than thirty different names in Galanthus, but there are only about ten really different.

GALAX *aphylla.* Wand Flower. A very curious plant, comprising its own family (Galacineæ). It is wild in the mountains of Virginia and North Carolina and grows in pure peat. The leathery, shining leaves turning to bronze brown in autumn are one of the best esteemed materials for table decoration, etc., in New York. The flowers are white, small, and in long spikes on a 30 cm. high, thin, and hard stem. They insist on an acid soil or pure peat in a cool and shady corner of the rockery.

Galeobdolon *luteum.* Yellow Nettle. European woodland Labiate with long radicant creeping branches bearing numerous bright yellow sage-like flowers (V-VII). Very good for underwoods and shady places where it runs all over and rapidly covers the ground.

Galium. Bedstraw. A rather weedy group near to Asperula and belonging to the Rubiaceæ. Some species are very cæspitose and rather invading individuals, but many are precious rock plants; among such are:

G. baldense IV; 10 cm.; white; E. Al.; 1, 4.
G. boreale V; 1·5 cm.; white; Eur.; 1.
G. cæspitosa V; 10 cm.; white; Py.; 1, 4; L.
G. Helveticum V; 10 cm.; white; Al.; 1, 4.
G. Olympicum VI; 5 cm.; white; E. O. Eur.; 1, 4.
G. purpureum VIII-IX; 20 cm.; dark brown; S. Eur.; 1, 4, 7.
G. pyrenaicum VII-IX; 5 cm.; white; Py.; 1, 4, 7.
G. rubrum VII-IX; 15 cm.; reddish; S. Eur.; 1, 4, 7.
G. verum VII-X; 40 cm.; yellow; Eur.; 1, 7.

Gaultheria. Wintergreen. Salal. *G. shallon* is a robust evergreen Ericaceous species with large greyish-green leaves covering the underwoods, and even the railway embankments in some parts of N. America. It is the characteristic shrub of the spruce forests, a low creeper sometimes reaching 2 m. high but generally only 10-25 cm.; small globulose white flowers and black or dark purple edible fruit. *G. ovalifolia, humifusa,* and *myrsi-*

nites are low evergreen shrubs from the Northwestern States and *G. procumbens* from Northeastern America is the best known and used in gardens. All require a peat soil in a shady corner. Propagation by runners, division, or from seed.

GAURA *coccinea* is a dwarf, very stoloniferous, and invading Onagrariad from the Rocky Mountains, 20-30 cm. high with reddish spikes of flowers. Good for the barren places. *G. Lindheimeri,* an American, too, is a big plant with graceful light pink flowers (VI-IX) for the border.

GENISTA. Broom. In spring and summer the Brooms are the light and the joy of the rock garden. They flower richly and just at a time when we want bright colours on the rockery. Some are too big for small rockeries, but generally they have just the size desired for animating or framing some alpine scenery. "What would we do without the Genista and the Cytisus!" a good rock gardener once remarked to me. "They are hardy and robust and want only a deep, meagre soil to drive their long roots." Some, however, are minute little things and I shall never forget my enjoyment when I discovered in the high Var (south of France), between the hardest stones of a *pierrier* an extremely dwarf little thing, indeed, hardly 1-2 cm. high, looking like a dwarf Equisetum, which I succeeded in digging up and so brought home. In due season it brought forth buds and then yellow papilionaceous flowers! It was *G. Villarsii.* Some others, as *anglica, hispanica,* and *occiden-*

talis, are dwarf and dense, while *G. sagittalis* is a creeping plant hardly worth calling a shrub, but looking like a creeping herbaceous carpet with numerous autumnal bright yellow flowers. All like full sun and stony soil. Seed or cuttings.

G. ætnensis VII; 1-2 m.; bright yellow; S. It.; 1.*
G. anglica VII-IX; 60 cm.; yellow; W. Eur.; 1, 4. P.
G. anxantina V-VI; 50 cm.; bright yellow; E. Eur., It.; 1, 4.
G. aspalatoides (*Lobelii*) VI; 30 cm.; yellow; S. Eur., Atl.; 1, 4.
G. cinerea IV-V; 60 cm.; yellow; S. Eur.; 1, 4. L.
G. corsica IV-V; 30 cm.; yellow; Co.; 1, 4.
G. dalmatica VI; 25 cm.; bright yellow; S. E. Eur.; 1, 4.
G. elatior VII; 1 m.; yellow; Atl.; 1, 4.
G. ephedroides VI; 80 cm.; yellow; Co.; 1.
G. ferox VII-IX; 80 cm.; yellow; Atl.; 1, 4.
G. germanica VII-IX; 70 cm.; bright yellow; Eur.; 1, 4.
G. hispanica VI; 20 cm.; yellow; Sp., Pyr.; 1, 4.
G. horrida V-VII; 30 cm.; yellow; S. W. Eur.; 1, 4. L.
G. humifusa VII; 10 cm.; yellow; Or.; 1, 4.
G. januensis V-VII; 40 cm.; light yellow; Banates; 1, 4.
G. juncea V-X; 1 m.; rich yellow; S. Eur.; 1.
G. linifolia VII; 1 m.; yellow; S. Eur.; 1.*
G. ovata VII; 50 cm.; yellow; E. Al.; 1, 4.
G. pilosa IV; 30 cm.; bright yellow; Eur.; 1, 4; L.
G. purgans V; 80 cm.; bright yellow; S. W. Eur.; 1, 4. P.
G. procumbens VI; 15 cm.; yellow; E. Al.; 4.
G. radiata VI-VII; 60 cm.; yellow; S. Eur.; 1, 4.
G. ramosissima VI; 80 cm.; yellow; Atl.; 1, 4.*
G. sagittalis VII-X; 1·5 cm.; bright yellow; Eur.; 1, 4.
G. (*Sarothamnus*) *scoparius* V; 1 m.; Eur.; naturalised in N. Am.; 1. P. (Var. *Andreana* (red brown with yellow) and numerous garden vars.)
G. scorpius VIII; 1, 50; yellow; S. Eur., Atl.; 1.
G. tinctoria VIII; 80 cm.; rich yellow; Eur., Si.; 1.

G. triquetra V-VII; 20 cm.; yellow; Co.; 1, 4.
G. Villarsii VI; 5-10 cm.; yellow; S. & E. Al.; 4.

GENTIANA. Gentian. In one of his best passages my late friend, P. Farrer, sang a hymn to the Gentians;[10] I have not his talent to so rhapsodise and space here is too short for that, anyhow. Everybody is aware of the value of these marvels but not everyone can domesticate them. In order to help the reader as much as possible I group the species according to their principal cultural requirements. They all can be grown from seed which must be fresh.[11] (See color plate facing p. 310.)

I. The old type *G. acaulis* includes four or five quite distinct, well-established forms. The best of all is the Queen of Gentians, *G. angustifolia* Vill. non Mich. (*G. occidentalis, G. sabauda*), with very long linear leaves, shiny on the upper side; the flower is the largest in the genus, sometimes 8 cm. high and 4 cm. broad, very elegant, of a beautiful sky-blue, the throat being gaily marked with five green spots. The plant is stoloniferous and sends its sprouts in all directions so that some tufts are remarkably large. I have seen on the Dauphiné Alps some patches of more than one metre diameter, and when such tufts are covered with their exquisite blue cups it is a most magnificent spectacle. That plant is confined to the Alps of Savoy and Dauphiné, and to the high Pyrenees, where it is not common, however. I believe it was the original type of the English garden "Gentianella" because it has (in common with *G. alpina,* which is out of the question, however) stoloniferous roots like Gentianella. It seems to do best on limestone mountains and likes exposure to the sun. I found it lately about four miles from Grenoble, enlightening a green meadow. We grow this treasure very easily at Floraire, as border plant, in the wall, or on the rockery. Some people use it for lawns; and I know of a meadow near here which is a grand picture. It likes lime but does as well in peat. *G. Clusii* from the calcareous rocks of the Alps and of the Jura is distinguished by its leaves, which are lanceolate, pointed, coriaceous, and dark green, not shining; by its non-stoloniferous character and by the smaller dark blue flower. *G. dinarica* is a Dalmatian form of *Clusii,* very near to it. Both require well-drained ground on the rockery, and if possible some lime in the soil. *G. Kochiana* (*G. excisa*) from the pastures of the Alps and of the Jura, has large, flat, spread-out leaves elliptical or broadly oblong; the flower is dark violet blue, not so fine as in *angustifolia* and its culture is not so easy. It likes peat. *G. alpina* is the one where the flower is really stemless and merits the name acaulis. It is recognised by its small leaves of a pale, almost glaucescent green, in rosettes, incurved; by its dark blue flower smaller than in the preceding species; and by the fact that it is stoloniferous. It is generally met on high grass slopes in the Alps and Pyrenees from 2000-2500 m. altitude. It likes acid soil and its culture is somewhat difficult. Moraine or *tourbière.* All these "Gentianellas" are to be propagated from seed (slow germination if not sown just after the harvest), cuttings or division for *angustifolia.* There are many albinos in the group. *G. Dumoulini* is a natural hybrid, *Clusii* x *Kochiana.*

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[10] *My Rock Garden*, pp. 210-224.

[11] For better and complete description of Gentians, see *Monography of Eugentiana*, of Kuznezow, Dorpat, 1904, which is useful but not up to date.

II. A group of thick, fleshy-rooted species of which *G. lutea* is the type. Farrer disliked the yellow Gentians and said of this: "It is dingy and coarse and cabbage-like and gigantic. Mr. Correvon lauds it as being a plant 'à formes architecturales.' Heaven bless me from such architectural adornments."[12] I certainly admire that old friend of my childhood and cannot understand why it should be anathematised. That big glaucescent foliage emerging from the pasturage, the stiff candelabra, 80 cm.-1 m. high, which arise from the tuft and bear their large flowered stems with yellow stars are a beauty, not only in the mountains but in the rock garden too. Moreover, dear Farrer, twelve years after having insulted the yellow Gentian, said in another book: "The huge and stalwart yellow Gentian has not always been duly appreciated. There is no doubt that at its best it is a truly glorious object with its vast corrugated leafage and towering spires of fine-rayed golden stars in dense whorled clusters to the top of the three or four foot stem."[13] It is a child of the calcareous mountains of Europe and, when you see it, you may be certain the ground is limy. Easy cultivation: deep, good, well-drained soil and half sun.

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[12] *My Rock Garden,* p. 219.

In the siliceous or granitic Alps and in the boreal regions, G. *lutea* is replaced by its cousin the red Gentian, G. *purpurea,* a marvel, to my idea at least. The plant is smaller than *lutea,* not exceeding 40 cm., with smaller dark green shining leaves; the flowers are opened only by the sun and are of a velvet red-brown colour, a rich Vandyck brown, says Farrer. The delicate fragrance of the flowers is one of the sweetest I know, with that of *Pyrola uniflora* which it recalls. It must be grown in pure peat in half shade in a well-drained soil. G. *punctata* from limestone Alps differs from the former by the purple punctate yellow flowers, well opened. Same culture, but with lime. G. *pannonica* differs by its reddish purple corolla; it is an inhabitant of the lime districts of the Oriental Alps and grows in same conditions as *punctata.* G. *Burseri,* from the limestone mountains of S. W. Eur., is a tall *punctata,* pure yellow. Same culture.

There are several natural hybrids between these four large Gentians: G. *Gaudiniana* (*punctata* x *purpurea*), G. *Thomasii* (*lutea-purpurea*), etc. All are easy to raise from seed, but they do not like to be disturbed. When transplanting the young plants it is essential that no root be cut.

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[13] *The English Rock-garden,* Vol. I, p. 379.

III. The *Pneumonanthe* group has strong growing plants generally found in damp soil, and propagated from seed. *G. asclepiadeæ,* Willow-Gentian, is the glory of our subalpine calcareous regions. It haunts the damp slopes, and the fresh shady woods, and its long bending sheaves of elegant flowers are the loveliness of autumnal days; its floral shapes, says Farrer, "bend under the weight of bloom like Acanthus leaves beneath that of a Corinthian temple." This is a strong, vigorous, fifty centimetre high plant. Easy to grow in rich leaf mould or ordinary soil in cool or damp corners. In the Wisley Garden of the Royal Horticultural Society it grows like a weed; I sent the first seeds of it to my late friend, G. F. Wilson, the founder of the Garden, in 1885, and five years after it could be seen all over. There is a beautiful pure white form growing on the shady slopes of the Via Mala which has been in gardens for 50 years. *G. pneumonanthe,* the Heath Gentian, is an autumnal beauty too. It grows in the marshes of Europe and Siberia, and bears its dark indigo flowers on 15-30 cm. high stems from June to September. It must be grown in the bog or in turf mould in a sunny, exposed situation. *G. pneumonanthe arvernensis* is a bigger form from Auvergne and *G. nicænsis* is a higher form from Japan.

To the same group belong the *G. septemfida,* an

Asiatic plant of great value for the rock garden, with many varieties. It is a late flowering beauty 30 cm. high with ample open flowers, large and splendid, of clear soft blue, giving joy from July to October. There is a Caucasian form called *Lagodechiana* which is certainly one of the best late flowering plants for the alpine garden; *G. septemfida cordifolia* from Turkish Armenia, *G. s. latifolia, G. s. angustifolia,* and *G. s. procumbens* are four different varieties originally distributed from the Regel & Kesselring garden in Petrograd. All these may be grown in leaf mould and peat, or even in a good loam. If in England or in the Maritime countries, give half shade or even a sunny position. *G. Freyniana* is a large flowering *septemfida* with brilliant bells of bright blue flowers.

IV. The *Cruciata* group is the easiest of all for our calcareous regions. *G. cruciata* is a European plant growing in the low parts of limestone mountains; sky-blue 4-lobed flowers on a 25 cm. high, vigorous, and leafy stem; VII-VIII. *G. phlogifolia* from the Carpathian Mountains and *G. depressa* from Transylvania are forms of it. Here is the list of the different kinds of this *Aptera* group:

G. biflora VII; 10 cm.; blue; Ch.; 8, 10.
G. dahurica VIII; 50 cm.; blue; Si.; 1, 6.
G. decumbens VIII; 40 cm.; blue; Si.; 1, 6.
G. Fetisowii VII-IX; 20 cm.; light blue; Si., Tu.; 1, 6.
G. Kesselringi VIII; 25 cm.; pale blue; Si.; 1, 6.

G. *Kuroo* VII; 15 cm.; indigo; H.; 6, 9.
G. *macrophylla* VI; 25 cm.; blue; Si.; 1.
G. *Olivieri* VII; 30 cm.; blue; Or.; 1.
G. *straminea* VII; 25 cm.; light yellow; Si.; 1, 6.
G. *tibetica* (*brevidens*) VIII; 30 cm.; bluish white; H.; 1.
G. *triflora* VIII; 20 cm.; sky blue; Ch.; 6, 10.
G. *Tschihantanica* VII; 25 cm.; blue; Si.; 1, 6.
G. *Walujewi* VI; 25 cm.; blue; Si.; 1, 6.

V. The *Frigida* group is a very fine one but not often met in gardens; they haunt high cliffs, the moraine, or the *tourbière* of the high mountains of Asia, Europe, and North America. Here the flowers are solitary or just a few grouped together.

G. *algida* VIII; 40 cm.; blue; Tu., Si.; 9, 10.
G. *frigida* VI; 10 cm.; pale blue; E. Al.; 6, 10.
G. *Frœlichi* VI; 15 cm.; light blue; E. Al.; 6, 10.
G. *ornata* VI; 3 cm.; dark blue; H.; 8, 9, 10.
G. *Przewaldskyi* VIII; 15 cm.; bright blue; Tu.; 6.
G. *Sikkimensis* VII; 25 cm.; blue; H., Tu.; 8, 10.

VI. Now we come to the group of the dwarf dense Gentians (type *verna*). This is the finest but the most difficult to acclimatise. But what a glorious sight they offer us! Farrer says of *G. verna:* "This is the Gentian of Gentians and it is engraved sadly on the conscience of every gardener. How then shall the glory of the upper Alps be made to repeat itself in sheets of heaven all over our garden in June? *Quot Gentianæ, tot sententiæ:* 'give them masses of lime,' says one; 'give them no lime at all,' says another; a third recommends full sun; and yet a fourth's Aunt Emily grew it for years in shade; and while some prepare for it a soil loose and spongy as possible, others ram down the loam with hammers to make it as hard as a threshing floor; and many put it in sand, and many in peat, and many in loam; and all sooner or later have plants that succeed; and all much sooner than later have many more plants that don't. The fact is, that after the first essential, a perfect drainage, is attained, the treatment of *G. verna* may reasonably vary within very wide ranges in different gardens and conditions." I would advise those who live in a maritime climate to grow it on a well-drained rockery rather than in a sunny exposure and on lime, as it is always better in Nature on calcareous than on peaty ground; and those who have a Continental climate to keep it on the moraine, watered from below. We have it here in the *tourbière;* but once I saw in a kitchen-garden border in England a large and brilliant *G. verna* as good as in Nature! Everyone must work out his own experience with each one of these dense tufted Gentians. Dr. Jenkin, at Hindhead in England, grows it like grass on his alpine bank and some of his neighbours at Haslemere have never succeeded. It is certainly worthy of an effort—and all the species of the group too. Seeds germinate easily, and one may try in different conditions.

G. æstivalis; a large flowering *verna.*
G. altaica V; 5 cm.; azure blue; Si.; 6, 9.
G. amœna IV; 2 cm.; bright blue; H. 10.

G. angulosa. See *G. Favrati.*
G. bavarica IV; 8 cm.; pure sky blue; Al.; 3, 10.
G. brachiphylla IV; 8 cm.; azure; Al.; 8, 9, 10.
G. Cachemiriana IV; light blue; H.; 10.
G. Favrati (*angulosa*) V; 5 cm.; intense azure; Al.; 6, 10. L.
G. imbricata IV; 8 cm.; bright blue; Al.; 10.
G. pumila IV; 5 cm.; azure; E. Al.; 9, 10.
G. pyrenaica V; 5 cm.; lilac blue; Pyr., Ba., Ca.; 8, 10.
G. Rostani VII; 10 cm.; intense azure; Ped. Al.; 9, 10.
G. terglouensis IV; 5 cm.; dark blue; E. Al.; 10.
G. verna III-IV; 8 cm.; azure blue; Eur., Ca.; 1, 6, 8, 10.
(Vars. *alba* (*chionodoxa*), *atrocærulea, azurea, grandiflora.*)

Following are several species, mostly American, which cannot be grouped and which must be grown according to their particular wants, which are varied:

G. affinis VI; 50 cm.; blue; N. Am.; 5, 6.
G. alba VIII; 40 cm.; yellowish white; N. Am.; 5, 9. P.
G. Andrewsi VIII; 60 cm.; lilac; N. Am.; 3, 6, 9.
G. angustifolia of Michaux VIII; 40 cm.; azure; N. Am.; 9.
G. Bigelowii VI; 15 cm.; light blue; N. Am.; 9.
G. bracteosa V; 10 cm.; lilac blue; N. Am.; 9.
G. calycosa VI; 25 cm.; yellowish-dotted; Cal.; 9, 10.
G. ciliata IX-X; 20 cm.; azure blue; Eur.; 10.
G. Farreri IX-XI; 10 cm.; azure and white; Ch.; 1, 6, 10.
G. gelida VIII; 25 cm.; yellow; Ca., Or.; 6, 9.
G. glauca VI; 10 cm.; greenish blue; Canada; 6, 9.
G. gracillipes VI; 25 cm.; light lilac; Ch.; 8.
G. hexaphylla V; 10 cm.; azure blue; Ch.; 8.
G. Jamesi VI; 10 cm.; violet red; Si.; 8.
G. Lawrencei VI; 10 cm.; blue; Si.; 8.
G. linearis VIII; 50 cm.; blue; N. Am.; 3, 9, 10.
G. Loderi VI; 10 cm.; light blue; Si.; 8.
G. Makinoi VI; 20 cm.; white; Jap.; 3.
G. montana VII; 50 cm.; white; N. Z.; 1, 6.

G. newberryi VII; 8 cm.; blue and white; Cal.; 8, 10.
G. ochroleuca VIII; 30 cm.; light yellow; N. Am.; 6.
G. olivana; hybrid, *septemdida* x *Parryi;* 6, 8.
G. oregana VIII; 40 cm.; light blue; R. M.; 6, 10.
G. Parryi VIII; 25 cm.; dark blue; R. M.; 3, 6, 10.
G. puberula IX; 25 cm.; pure blue; N. Am.; 6, 8.
G. Purdomii VII; 15 cm.; deep blue; Ch.; 1, 6.
G. saponaria VIII; 30 cm.; brilliant blue; N. Am.; 9.
G. saxosa VII-IX; 15 cm.; light blue; N. Z.; 9, 10.
G. scabra VI; 20 cm.; blue; Si.; 6, 9.
G. sceptrum VII; 1 m.; deep blue; N. Am.; 3, 6, 9.
G. sino-ornata IX-X; 20 cm.; azure blue; Ch.; 8, 10.
G. siphonantha VII; 15 cm.; blue; Ch.; 6, 9.
G. tubiflora VI; 2 cm.; azure blue; H.; 9, 10.
G. Veitchiorum VIII; 15 cm.; deep blue; H.; 8, 10.

There are several annual Gentians which may be sown, some of them directly "in situ," but generally in pots in the usual manner: *G. amarella, austriaca, campestris, germanica, livonica, uliginosa,* all violet; and *G. barbata, carpathica, detonsa, nivalis, uliginosa, utriculosa,* sky or bright blue; *G. pleurogynoides* and *tenella,* bluish purple.

GERANIUM. Cranesbill. A very big genus largely represented all over the world; a great number of the species are herbaceous perennials suitable for the border and the wild garden; but we have a reasonable collection suitable for the rockery. They ask for no special care, but the *argenteum* group, which is the nicest for the rock garden, wants a well-drained soil as it rots easily. Propagate by seed, cuttings, or division.

G. aconitifolium. See *rivulare.*
G. affine VI; 40 cm.; rose; Si.; 1.
G. albanum VI-IX; 50 cm.; light rose; Or.; 1, 2.
G. alpicolum; the South American form of *argenteum.*
G. alpinum VII; 40 cm.; dark blue; Tu.; 1, 6.
G. argenteum VII; 8 cm.; light mauve; S. Al.; 4, 6. (A var. *alba.*)
G. armenum VII; 80 cm.; carmine; Or.; 1.
G. atlanticum VI; 15 cm.; rose; At.; 6.*
G. cæruleatum VI; 40 cm.; blue; Tr.; 1, 6.
G. cæspitosum VII; 12 cm.; purple; N. Am.; 1, 6.
G. cinereum VI; 10 cm.; mauve; Pyr., Sp.; 1, 4, 6.
G. Endressi VII-X; 40 cm.; bright pink; Py.; 1, 2.
G. Farreri (*napuligerum*) IV; 10 cm.; lilac; Ch.; 1.
G. fremonti V; 30 cm.; mauve; R. M.; 1.
G. grandiflorum VI; 30 cm.; deep blue; H.; 1, 2.
G. ibericum VII; 50 cm.; dark blue; Ca.; 1.
G. Kotschyi VIII; 15 cm.; rose; Ca.; 1.
G. lancastriense VI; 8 cm.; light rose; Walney Island; 1, 4.
G. lividum VI; 60 cm.; dark violet; Eur.; 1.
G. macrorhizum VI-X; 30 cm.; bright pink; S. E. Eur.; 1.
G. maculatum VII; 20 cm.; pale rose; N. Am.; 1.
G. nepalense VII; 40 cm.; rose; H.; 1.
G. nivale; a minute *argenteum* from the Andes.
G. nodosum VII; 30 cm.; lilac; Eur.; 1, 3.
G. palustre VI; 50 cm.; bright carmine; Eur.; 1, 3.
G. phæum VI; 50 cm.; dark purple; Al.; 1.
G. platyanthum VII; 60 cm.; rose; H.; 1.
G. platypetalum VI; 40 cm.; bright violet; Or.; 1.
G. polyanthes VIII; 30 cm.; blue; H.; 1, 6.
G. pratense VI-XI; 60 cm.; blue; Eur., Si.; 1, 7.
G. Pylzowianum VII; 25 cm.; clear rose; H.; 1, 6.
G. rivulare V; 50 cm.; white; Al.; 1. (*aconitifolium.*)
G. sanguineum V-IX; 30 cm.; rich carmine; Eur., Si.; 1. (Vars. *albiflorum* and *prostratum.*)
G. sessiliflorum V-IX; 3 cm.; light rose; N. Z.; 1.*

G. subcaulescens; a Transylvanian *argenteum* with carmine flowers.

G. sylvaticum VII; 40 cm.; violet; Eur.; 1, 2.

G. Traversi VIII; 20 cm.; rose; N. Z.; 1.*

G. tuberosum III; 15 cm.; carmine; S. Eur., Or.; 1.

G. Wallichianum VII; 30 cm.; violet; H.; 1.

GEUM. Avens. There is great disorder in garden catalogues over these Rosales and it is difficult to be clear about them. We are often asked for *Geum bulgaricum* which is the worst one of all, with small, drooping, yellowish flowers of no beauty; if seeds or plants of this are sent we get complaints because the customer ordered "a beautiful red-flowering plant"; alas, we cannot change the nature of the species, so send in reply *G. Heldreichii,* which probably was the one wanted in the first place. This is not the only case of confusion. Geums want a good, light soil, and some of them are bog plants. They are easily raised from seed and can be increased by division. (See color plate facing p. 262.)

G. atlanticum V; 30 cm.; yellow; Atl.; 1.

G. Borissii; an orange yellow hybrid.

G. chilœnse VI; 40 cm.; scarlet red; S. Am.; 1.

G. coccineum VI-XI; 40 cm.; bright scarlet; Ba., Or.; 1. (Several vars.: *atrosanguineum, Mrs. Bradshaw, Mr. Bradshaw, Fireball, fl. pl., sanguineum,* etc.)

G. Florariensis; hybrid with yellow flowers and brown stems.

G. Heldreichii VI-IX; 30 cm.; bright orange; Gr.; 1, 4.

G. Magellanicum VI; 20 cm.; yellow; S. Am.; 1.

G. montanum V; 20 cm.; bright yellow; Eur.; 1, 4. (Several vars.: *aureum, grandiflorum, maximum.*)

G. pyrenaicum V; 25 cm.; bright yellow; Py.; 1.

G. reptans IV; 15 cm.; bright yellow; Al.; 4. L.

G. rhæticum; a natural hybrid, *reptans* x *montanum.*

G. rivale, Water-Avens, V-IX; 60 cm.; red brown; Eur., N. Am.; 3. (The var. *grandiflorum* is an English introduction of great value.)

G. Rossii VII; 20 cm.; yellow; N. Am.; 1.

G. Royleyi VI; 30 cm.; yellow; H.; 1.

G. speciosum VI; 60 cm.; yellow; Ca.; 1.

G. triflorum V-IX; 40 cm.; reddish pink; N. Am.; 1, 3.

G. tyrolense VI; 10 cm.; yellow; E. Al.; 6.

G. uniflorum V; 10 cm.; white; N. Z.; 8.

There are other hybrids and varieties: *G. Dolly North,* very bright red; *Kolbianum* (*montanum* x *reptans*); Lady Strathеden, bright yellow; *miniatum* (*coccineum* x *montanum*); *montanum hybridum,* and two rich vars. of Heldreichii, *magnificum* and *splendens.*

GILIA (Leptodactylon) *californica.* Prickly Phlox. This is an erect shrub 80 cm.-1 m. high, with small leaves and beautiful solitary flowers, bright rose or pink, which grows on the low mountains of California. It looks like a Phlox and is a real beauty but not easy to grow. I saw it in full health in the centre of London at Hyde Park near the cottage of Mr. Hay, the superintendent of the London gardens. Here we must keep it under glass for the winter; VII-IX. *G. coronopifolia* of California is a bright beauty with crimson flowers, but biennial. *G. pungens* recalling the pink creeping Phlox is very nice. All want sandy peat and sun and are propagated by seed or cuttings.

GILLENIA *stipulacea* and *trifoliata* are two North American Rosales near to Spiræa, with dark brown stem, beautiful white flowers all the summer through. They do well in our borders and make bushes 80 cm. high. Good for big rockeries. Division or seed.

GLADIOLUS is indeed an important genus in the present-day garden world. We are not concerned with the garden varieties, however. But there are nice types growing either in the marshes or in the fields of Southern Europe and Mediterranean regions which are very graceful and suited for the rockery: *Gladiolus byzantinus,* fine pink; *communis,* carmine; *Illyricus,* carmine; *imbricatus,* dark carmine; *palustris,* carmine and rose, for damp meadows or bog; *segetum,* light carmine. They do not differ very much and are good flowering from V-VII, not exceeding 50 cm. high. They want—excepting G. *palustris*—a sandy, deep, well-drained soil and a sunny exposure. Seed (slow germ.).

GLAUCIUM. Horned Poppy. These curious Poppyworts are mostly of biennial duration but, here on a barren, sandy bank in the garden, we let them reproduce themselves, and they do splendidly. They want a deep, meagre soil and full sun. The foliage is especially beautiful, and as the plant is quite hardy and the silvery-hued glaucous and villose leaves really ornamental, it is often used for winter decorative bedding. They are also first rate for winter bouquets and for table decoration. The type is G. *luteum,* a strong branching plant, 80 cm. high, with fugitive yellow flowers; as in all the Glaucium the seeds are borne in long horny pods which are one of the curiosities of the genus. It grows on sandy banks and along the railway embankments of South Europe, in poor soil and barren places. *G. rubrum,* with terra cotta flowers, is found in Greece; and *G. tricolor,* red, black, and yellow, is a garden variety. Luther Burbank obtained some good large-flowering vars. called *Burbank's Variety.* Easy reproduction from seed.

GLAUX *marítima* is a dwarf creeping seashore plant, interesting but of no garden value. It belongs to the Primulaceæ.

GLOBULARIA. Globe Daisy. The blue globes of the common Globularia haunted my childhood days after seeing them once, and for a few minutes only, adorning the rocks near La Sarraz. It is such a nice little thing and such a curious colour! The pale grey blue tint is rare in Nature and still more in the garden. There are albino varieties of all the species. They want a very sunny place and a dry situation. Division or seed.[14]

G. Alypum V-XI; 25 cm.; sky blue; Med.; 1.*
G. bellidifolia VI; 5 cm.; blue; It. 4.
G. cordifolia VI; 10 cm.; lilac blue; S. Eur.; 4, 6.
G. incanescens VI; 10 cm.; deep lilac; It.; 4, 6.
G. majoricensis V; 30 cm.; light blue; Baléares; 6.
G. nana VI; 3 cm.; pale greyish blue; S. Eur.; 4, 6.
G. nudicaulis VI; 20 cm.; lilac blue; Al., Py., Cp.; 1, 4.
G. pygmæa is a still dwarfer *nana.*
G. spinosa VII; 15 cm.; lilac blue; Sp.; 4, 6.
G. stygia VI; 10 cm.; greyish blue; Gr.; 4, 6.

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[14] See Wettstein, *Globulariaceæ* in Engler's *Naturl. Pflanzen Familien.*

G. trichosantha VI; 20 cm.; lilac blue; Or., Ca.; 1, 4.
G. vulgaris (Willkomii) VI-IX; 20 cm.; light greyish blue; Eur.; 1.

GNAPHALIUM. Practically all are annual and unworthy plants from the garden point of view. *G. supinum* is a very dwarf, white-leaved perennial growing on the high peat ground of the Alps; New Zealand offers *G. grandiceps,* a kind of Edelweiss, and *G. Traversi,* a dwarf white thing 5 cm. high.

GOODENIA *repens.* See SELLIERA.

GOODYERA. See Terrestrial Orchids.

GUNNERA. There is only one of these curious Nettles, whose leaves are uniquely decorative, which can be admitted to the rock garden and that is *G. magellanica* from South Chili, a dwarf carpeting plant with dark green shining leaves; it wants leaf mould or peat and, here at least, protection in winter.

GUTIERREZIA *Euthamiæ.* Matchweed. This thin-leaved yellow-flowering Composite is one of the best plants found in the deserts of Western America as a summer dress. I saw that fine little shrubby herb all along the railroad line in the most desolate regions, its bright yellow little stars shining on 10 cm. high stems. It stands both drought and the heat and is good for dry rockeries and sunny places. Prop., cuttings and seed.

GYMNADENIA. See Terrestrial Orchids.

GYMNOLOMIA *multiflora.* A yellow Mexican Composite of little value.

GYPSOPHILA. Baby's Breath. These plants of the Stichwort family are sometimes big, cumbering things, as the Bride's Veil (*G. paniculata*), but many are low, creeping, carpeting plants; they have white or light rose flowers, sometimes marked with purple lines, always very abundant and, in some cases, entirely covering the dense tuft. They are good wall or rock plants. Prop., seed or cuttings. (See color plate facing p. 406.)

G. alpigena VI; 10 cm.; light rose; E. Al.; 1, 4.
G. anatolica VII; 60 cm.; light rose; Or.; 1.
G. aretioides VI-IX; 2 cm.; pearl colour; Or.; 4, 6.
G. cerastioides (Saponaria); V-VII; 5 cm.; white and dark purple; H.; 4, 6.
G. erinacea VII; 10 cm.; white; Afgh.; 4, 6.
G. Libanotica VI; 25 cm.; pink; Leb.; 1', 4, 6.
G. Olympica VI; 10 cm.; light pink; Gr.; 1, 4.
G. paniculata VI-VIII; 1 m.; white; E. Eur.; 1. (A var. *flore pleno.*)
G. repens V-X; 10 cm.; pinkish white; Eur.; 1, 4. (A var. *major* or *monstrosa.*)
G. Sundermanni is *alpigena.*
G. transylvanica (*Banffia petræa*) V; 8 cm.; light rose; E. Eur.; 4.

HABERLEA *Rhodopensis.* A cousin of the Ramondia belonging to the Gesneraceæ; a real wall plant, densely foliated with thick leaves and bearing in May and June lilac-lavender small Gloxinia-like flowers; it grows in the Balkans and has an albino form, *virginalis,* and a sister, *H. Ferdinand-Coburgi,* with larger flowers. They want the north side of a wall, and the same situation as Ramondia. Prop. from leaf cuttings or seed.

Hacquetia (Dondia) *Epipactis.* A relative of Astrantia, growing in shady woods in E. Eur., and bearing in March and April some 10 cm. high stems with minute yellow flowers enclosed in a frill of green bracts so that the popular name is "the green flower." Prop. division or seed (slow germ.).

Hedysarum. French Honeysuckle. These are Pea-flowers, sometimes shrubby as in *H. multiflorum,* a Himalayan species, with carmine flowers, good for the rockery. They have long and deep wandering roots and are useful for retaining the soil. The best of all is our alpine *H. obscurum* with brilliant, deep carmine flowers (VI-VII) forming clusters, and *exaltatum,* a larger one from the Southern Alps. Good, deep soil. Seed.

Heeria *elegans* from the Mexican mountains is a real beauty; a dwarf creeper, covering the soil with its gay foliage on carmine stems and bearing from May to October large, almost stemless, brilliant flowers of the brightest magenta, a unique colour among the rock plants; not hardy here.* It is melastomaceous. Division, cuttings, or seed.

Helianthella *quinquænervis* and *uniflora* are two large-flowering Sunflowers with big entire leaves and a great solitary yellow head on 30-40 cm. high stems. They are North American and like deep soil and sun. Seed or division.

HELIANTHEMUM. Sun Rose or Rock Rose. In the summer months the Rock Roses are the pride of Floraire; we have them in all the meagre and sunny places of our natural garden, on gravel, on loam, on chalk, on rocks, in borders, and all are doing splendidly if only planted in full sun. The colours, masses of pink, carmine, red, copper, orange, yellow, gold, ochre, sulphur, pearl white, pure white, bicolor, are combined to produce the best pictures possible. They are dwarf creeping or erect shrubs nearly allied to Cistus and have, like them, beautiful small rose flowers, some of them being fugitive. Loudon, in his *Arboretum,* gives 99 different kinds; Paxton's *Dictionary* lists 148, and the *Index Kewensis* recognises 147 real species and a large number of varieties.[15]

Now, of all these Sun Roses there are hardly twenty species (and a larger lot of garden varieties) really good for our purpose; most of them like lime, and all prefer meagre, gravelly soil and are obtained from seed or cuttings made in August. If, just after the blooms are over, the flower stems are cut back to the upper leaves, they flower again in the fall. They do not like manure, and flower according to the poverty of the soil. Very good plants for the barren slopes, wall, etc.

H. alpestre VI-VII; 10 cm.; yellow; Al.; 1, 4.
H. alyssoides VII; 40 cm.; yellow and brown; S. Eur.; 1, 4.
H. amabile V-VI; 25 cm.; light rose; S. Eur.; 4.

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[15] *The Journal of the R. H. S. of London,* January, 1926, p. 119, has a complete list and descriptions of all the known varieties.

H. apenninum VI-X; 20 cm.; white; S. Eur.; 1, 4.
H. bicolor VI; 20 cm.; yellow and red; S. Eur.; 1, 4.
H. canum V-VII; 8 cm.; yellow; S. Eur.; 1, 4. L.
H. coccineum VI-IX; scarlet red; 1, 4. (A splendid variety, *fl. pl.,* Fire-Ball.)
H. croceum V-VIII; 20 cm.; bright orange red; Med.; 1, 4.
H. cruentum VI; 20 cm.; terra cotta; red; S. Eur.; 1, 4.
H. (*Cistus*) *formosum* VI; 30 cm.; yellow and black; Portugal; 1.*
H. Fumana (*Fumana vulgaris*) VII; 15 cm.; yellow; S. Eur.; 4. L.
H. grandiflorum VI-X; 20 cm.; bright yellow; 1, 4, 7.
H. hirtum VII; 20 cm.; yellow; S. Eur.; 1, 4.
H. lavandulæfolium VII; 25 cm.; bright sulphur; Med.; 1, 4.
H. lunulatum VI; 25 cm.; yellow and red; It.; 1, 4.
H. mutabile VII; 20 cm.; variable in colour; S. Eur.; 1, 4.
H. polifolium VI-IX; 25 cm.; white or pink; S. Eur.; 1, 4.
H. pulverulentum VII; 25 cm.; white; S. Eur.; 1, 4.
H. purpureum VI; 15 cm.; bright pink; S. Eur.; 1, 4.
H. roseum V; 20 cm.; light pink; S. Eur.; 1, 4.
H. rubrum VI; 25 cm.; bright red; Med.; 1, 4.
H. sanguineum V; 20 cm.; deep carmine; S. Eur.; 1, 4.
H. sulfureum V-VII; 20 cm.; sulphur yellow; S. Eur.; 1, 4.
H. tomentosum VI-IX; 20 cm.; bright yellow; S. Eur.; 1, 4.
H. tuberaria V-VI; 25 cm.; yellow; Med.; 6.*
H. vulgare V-X; 20 cm.; bright yellow; Eur.; 1, 4, 7. (Some of the most recommendable varieties are: *apenninum fl. pl., aurora, Brilliant, the Bride, Garibaldii, grandiflorum fl. pl., mutabile fl. pl., polifolium fl. pl., roseum fl. pl., vulgare fl. pl.*)

HELICHRYSUM. Everlasting. Sungold. More or less woolly Composites with whitish and often aromatic foliage and brilliant flowers. They are plants from the Southern and sunny countries and flower in the summer months; some good annuals in the genus find no place here. They want a light sandy soil, full sun, and a dry situation. Increased by seed, division, or cuttings.

H. anatolicum VII-VIII; 30 cm.; yellow; Or.; 1.
H. arenarium VII; 20 cm.; golden yellow; Or.; 1.
H. bellidioides VII-IX; 30 cm.; white; Aus.; 1.*
H. frigidum VII; 5 cm.; white; Co.; 4, 8, 10.
H. grandiceps VII; 10 cm.; whitish; N. Z.; 4, 6.
H. lanatum VI-IX; 20 cm.; yellow; Or.; 1.
H. niveum VIII; 25 cm.; white; Or.; 4, 6.
H. orientale, French Immortelle, VI; 20 cm.; yellow; Or.; 6.*
H. Stœkas VII; 25 cm.; yellow; S. Eur.; 1.

HELIOSPERMA. See SILENE.

HELLEBORUS. Christmas Roses. Lent Roses. One of the most valuable groups of perennials, flowering at a time when there is little else in bloom. The Christmas Rose (*H. niger*) has been grown since the sixteenth century, but the Oriental kinds are younger in our gardens. All can be recommended for the rockery, liking generally a good, deep, rich loam, well drained and half shade. They are reproduced from seed (slow germ.) or division, but the plants do not like to be moved and the older they are the better they flower. Division must be made in July when the plants are at their greatest vigour. They are slow to establish, but once acclimatised they do gloriously.

H. abschasicus III; 30 cm.; deep purple; Ca.; 1, 2.
H. antiquorum III; 30 cm.; whitish; Or.; 1, 2.
H. atrorubens II-IV; 20 cm.; reddish green; E. Al., Cp.; 1, 2.
H. colchicus III; 30 cm.; deep copper purple; Or.; 1.
H. fœtidus I-IV; 70 cm.; purplish green; Eur.; 1. L.
H. guttatus III-IV; 25 cm.; whitish yellow; Or.; 1.

H. hybridus; the garden hybrids, sometimes beautiful.
H. Kochii III; 30 cm.; reddish; Or.; 1, 2.
H. latifolius I-III; 30 cm.; white; E. Eur.; 1.
H. lividus II; 50 cm.; greenish; Baléares; 1.*
H. multifidus III; 35 cm.; rose; It.; 1.
H. niger XII-III; 25 cm.; rose; white; S. E. Eur.; 1, 2. (Var. *altifolius,* better, larger, taller.)
H. occidentalis III-IV; 25 cm.; greenish; Py.; 1, 2.
H. odorus III; 20 cm.; rose; Tr., Cp.; 1, 2.
H. Olympicus III; 25 cm.; whitish; Gr.; 1, 2.
H. orientalis II-IV; 25 cm.; pink and white; Or.; 1. (Numerous garden vars. of this are called Lent Roses.)
H. pallidus II-III; 25 cm.; rose; Tr., Ba.; 1.
H. purpurascens III; 15 cm.; reddish violet; Cp., Tr.; 1, 2.
H. viridis II-IV; 20 cm.; bright green; S. Eur.; 1, 2.

HELONIAS *bullata.* Swamp-Pink. A liliaceous plant of North America with large rosette of basal leaves which sends up in April a naked 30 cm. high stem bearing a thick spire of small pink flowers resembling Bistorta. It is a bog plant, liking the waterside and the peat marshes. Seed (slow germ.).

HELXINE *Soleirolii.* A Corsican creeping Nettle which rapidly covers the ground, not quite hardy with us. It has small, rounded, crinkly-looking leaves of bright emerald green. Especially delightful for rambling over and carpeting cool and shady rocks in England and W. Eur.

HEPATICA. See ANEMONE *Hepatica.*

HERACLEUM. Cow-Parsnip. Big and statuesque Umbellifers for the picturesque and wild garden. They are bold plants with ample and strong-smelling foliage, and stiff, erect stems bearing innumerable white flowers (Dr. Levier counted 10,000 on an umbel of *H. Mantegazzianum* we had sent him 30 years ago). Some of the lower kinds, only, can be admitted to the rockery. *H. Mantegazzianum* was brought from Abchasia in 1890 by Dr. Levier and is recognised as one of the best honey plants for bees.[16] Reprod. only from seed (slow germ. if not quite fresh).

H. alpinum VII; 50 cm.; white; Jura (not alpine); 1, 2.
H. Mantegazzianum VIII; 2 m.; pinkish white; Ca.; 1, 2, 3.
H. pyrenaicum VII; 1 m.; white; Py.; 1, 2.

HERNIARIA. Minute Paronychiads of the mountains of Europe and Asia with greenish flowers; they are masses of carpeting foliage. Good for paved walks and barren, meagre places. *H. glabra* is useful for dry slopes, very sunny, and very sterile. It forms a large carpet 2-3 cm. high of yellowish green. *H. incana* is greyish green. Seed.

HERPOLIRION *Novæ-zelandiæ.* An exquisite dwarf 5-10 cm. high Liliad of the New Zealand Alps, growing on moist places and producing relatively large blue or lilac Merendera-like flowers in autumn. Seed (slow germ.).

HESPERIS. Rocket. Sister of the Wallflowers and the Stocks, the Rockets are large and rather bulky Crucifers generally too big for the rockery. Some of them, however, can be admitted: *H. armena* from the Or., with deep purple flowers on 30 cm.

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[16] See H. Correvon, *Plantes et Santé,* p. 159.

high stem; *breviscapa* (5-8 cm.), bright pink from Greece; *humilis,* Oriental, with violet flowers on 5 cm. stem. Seed. The *H. matronalis,* Dame's-Rocket, and its *fl. pl.* variety are old border plants.

HESPEROCHIRON *pumilus* and *californicus* are two hardy Borages of the Sierra Nevadas (Cal.) with purplish flowers, and ask for a sheltered place on the rockery.

HETERANTHA *limosa* is a dwarf bog plant near to Pontederia, with linear leaves and brilliant blue flowers; not very hardy with us.

HEUCHERA. Alum Root. These Saxifrages are nice and graceful things with numerous small flowers in elegant spikes; flowers greenish, or pink, or coral rose. They do well in half-shady rockeries in light soil and *sanguinea* succeed pretty well in gardens of mountainous regions despite their Mexican origin. Prop. by cuttings, division, or seed.

H. brizoides, VI; 30 cm.; white; garden origin; 1.
H. cylindrica VII; 50 cm.; greenish; N. Am.; 1.
H. micrantha VII; 25 cm.; yellowish white; N. Am.; 1.
H. rosea VII; 30 cm.; light rose; Can.; 1.
H. rubescens VI-IX; 40 cm.; reddish brown; N. Am.; 1.
H. sanguinea VI-IX; 30 cm.; bright coral rose; N. Mexico; 1. (Numerous vars. *alba, grandiflora, major, splendens.*)
H. tiarelloides; a hybrid, *Heuchera* x *Tiarella.* There are now numerous garden varieties (more than 100).

HIERACIUM. Hawkweed. This is the commonest representative of the Compositæ in Europe, and has innumerable forms, varieties, and hybrids. Some botanists consecrated their lives to the study of the group, and indeed I am full of compassion for these poor fellows. I think it is enough to enjoy the few really pleasant species, to introduce them to the rockery, in so far as they are not troublesome weeds. In that case we may plant them in the Swiss meadows. There are many kinds belonging in the high altitudes which demand care, but the great majority of species grow like weeds. Division or seed.

H. albidum (*Intybaceum*) V; 10 cm.; sulphur yellow; Al.; 4, 10.
H. alpinum IV; 10 cm.; bright yellow; High Al.; 6, 10.
H. aurantiacum V-XI; 25 cm.; scarlet red; Eur.; 1, 4. (Invading.)
H. (*Andryala*) *lanatum* VI; yellow; S. Eur.; 1', 4.
H. rubrum VI-IX; 8 cm.; bright scarlet; S. Eur.; 1, 4, 6.
H. stoloniflorum V-XI; 20 cm.; crimson red; Cp., Tr.; 1. (Inv.)
H. villosum VI; 20 cm.; bright yellow; Eur.; 1, 4.

HIPPOCREPIS *comosa.* Horseshoe Vetch. A dwarf creeping Papilionad, 5-8 cm. high, forming dense tufts on the limestone slopes of Europe; good for sunny and barren places. Light-coloured foliage and golden-yellow heads of flowers all summer. Cult.: 1, 4. Seed.

HOMOGYNE. A Composite with evergreen shining leaves and pink flowers on naked stems disposed in little heads. They are stoloniferous and invading but very good for woodland and shady places, carpeting the ground with bright green foliage all the year long: *H. alpina,* common all over Europe; *H. discolor,* with silver-white reverse of the leaves; *H. sylvestris,* an E. Eur. with deeply lobed leaves. Division or seed.

HORMINUM *pyrenaicum.* A Labiate with embossed oval leaves forming large and flat rosettes and bearing deep blue salvia-like flowers unilaterally disposed on a 15-20 cm. high stem. This lime-loving plant is not only Pyrenean, but is also very common in the Austrian and Italian Alps. Vars. *album* and *rubrum.* Half shade with leaf mould. Division or seed.

HOTTONIA *palustris.* Water Violet. A primulaceous species with Fern-like foliage sending up its flowers (which resemble those of *Gardamine pratensis*) upon the water, and in springtime adorns the canals of Holland, giving them a grace and an elegance they need from an artistic point of view. It is valuable for ponds, but disappears if the current is too strong.

HOUSTONIA. Bluets. These are the marvels of the meadow in New England, and I never shall forget the impression at Valley Forge (Pa.) from the sight of the sky-blue carpet of *H. cærulea* near the Washington memorial. My friend, Mr. Haughton, who drove me there, was really astonished to see his Genevese visitor so excited over the azure carpet. This is a rubiaceous plant, but I long lived with the idea that it was a Gentian. It is, in fact, a dwarf blue Bouvardia, with an exquisite flower. Lady's Cushion, as it is sometimes called, is more appropriate for this than for the Erinaceas, which are sometimes so called in Spain. *H. serpyllifolia* (called Innocence) suggest a heaven of blue China (Farrer); *H. purpurea* has white flowers with purpurescent buds. Many Americans who come to enjoy our Gentian fields seem never to have heard of the Houstonia and never saw it! I would like to return once more to New England, only to enjoy the fields of *Houstonia cœrulea.* I brought some home with me and they did splendidly in our *tourbière*—pure peat, watered from below. They are positively calcifuge and want full sun and peat. Division or seed.

HOUTTUYNIA *cordata* (Anemopsis). From China and Japan, a bog plant belonging to the Piperaceæ. It is invading and has white stolons bearing cordate leaves on pinkish stems and small white flowers. *H.* (Anemopsis) *californica* is not quite hardy with us, and is but a poor thing, anyhow.

HUGUENINIA *tanacetifolia* (*Sisymbrium pinnatifidum*). A huge Crucifer with bright yellow flowers forming big golden bunches in the calcareous W. Al., and haunting the fresh and cool corners. It is one of the glories of the Cenisian mountains, but is very hard to cultivate here in our dry atmosphere; we grow it in the shade house where it flowers well but seeds badly; in the English climate it does better. Seed.

HULSEA *algida, nana,* and *vestita* are Californian balsamic Composites with yellow heads liking some sheltered place on the rockery; they resemble Arnica in their glandular foliage. Division or seed.

HUTSCHINSIA (LEPIDIUM or NOCCÆA). These Crucifers are a type of true alpine vegetation. Dwarf cushions, bright green, covered with pure white flowers from March to June, not exceeding 8 cm. high; they are very good for cool and shady parts of the rockery, or on a north wall. *H. alpina* and *brevicaulis* are alpine; *H. auerswaldi* is Spanish. Seed.

HYACINTHUS. A group of plants grown in the garden for ages. Two only can be recommended for the rock garden: *H. amethystinus,* from the central Pyrenees and the Balkans, is a delightful deep blue ball on 20 cm. high stem (IV-V); *H. ciliatus* (*azureus*) of Asia Minor, flowering earlier, wants a cool place and a well-drained corner in the rockery. Seed (slow germ.).

HYDRASTIS *canadensis.* Goldenseal. A ranunculaceous plant of great medicinal value with Actæa-like foliage and small white flowers. It is N. American and wants pure peaty, acid soil on shady places; 3, 9. Seed (slow germ.).

HYDROCHARIS *morsus-ranæ.* Frog-Bit. A pretty water plant with floating leaves and three-petaled white flowers (a minute Sea Rose). It disappears in autumn, sinking to the bottom of the pond, to come up again the next spring.

HYDROCOTYLE. Pennywort. Small, creeping, with round leaves and inconspicuous flowers. Several kinds are introduced, but they are all too rank growers to be recommended except for invading barren marshes. *H. vulgaris,* the European kind, grows in our marshes; *H. moschata* and *microphylla* from N. Z. are nice enough things, but not quite hardy here.

HYDROPHYLLUM *canadense.* A bog plant of North America, with big foliage, and unshowy purplish flowers, succeeding in damp and shady places. Invading. Division and seed.

HYLOMECON (*Stylophorum*) *japonicum* is a low Celandine with bright yellow flowers (III-IV) for shady places in rich humus soil. Division or seed.

HYOSERIS. See APOSERIS.

HYPERICUM. St. John's-Wort. Those who like the colour of the sun must introduce these plants to their gardens. This is an extensive genus consisting for the most part of shrubby or sub-shrubby plants but including good perennials and dense creepers. The Oriental *H. calycinum* (Rose of Sharon) is used in our public gardens for covering the ground in barren places, woodlands, or very dry hills. Its showy foliage and its very large brilliant yellow flowers with innumerable reddish stamens are one of the glories of our garden. It is one of the hardiest and of the most resistant plants; drought and moisture do no harm. All the Hypericums can be divided or sown easily. Those marked (sh.) are shrubby.

H. adenocladon VII; 6 cm.; gold yellow; Or.; 1.
H. ægyptiacum VII-IX; 20 cm.; light yellow; Or.; 6.*
H. amanum VI; 50 cm.; yellow; Or.; 1.
H. anagalloides, Tingers Penny, VII; 10 cm.; salmon; Cal.; 6.

H. androsæmum VI; 80 cm.; yellow; Eur.; 1, 2.
H. armenum VI; 20 cm.; yellow; Or.; 1, 4.
H. ascyron VI; 50 cm.; yellow; Si.; 1, 2.
H. athoum V; 5 cm.; yellow; Or.; 1, 4, 6.
H. atomarium VI; 15 cm.; yellow; Or.; 4, 6.
H. aureum VI-IX; 80 cm.; light yellow; H.; 1. (sh.)
H. balearicum VII; 50 cm.; yellow; Baléares; 6. (sh.)*
H. bithynicum VII; 40 cm.; brilliant yellow; Gr.; 1.
H. Burseri (pyrenaicum) VII; 30 cm.; yellow; Py.; 1.
H. callyanthum VII; 40 cm.; yellow; Or.; 1.
H. calycinum VII-IX; 25 cm.; bright yellow; Or.; 1, 2, 4. (Creep.)
H. caprifolium VIII; 30 cm.; yellow; Sp.; 1. (sh.)
H. concinnum VII; 20 cm.; yellow; Cal.; 1, 6.
H. confertum VI; 10 cm.; yellow; Or.; 1, 4.
H. coris VI-IX; 8 cm.; light yellow; S. Eur.; 4. (sh.)
H. crenulatum VI; 10 cm.; yellow; Or.; 6.
H. cuneatum VI; 15 cm.; yellow; Or.; 6.
H. delphicum VII; 30 cm.; yellow; Gr.; 1, 4.
H. densiflorum VIII; 30 cm.; yellow; N. Am., 1. (sh.) P.
H. elongatum VII; 40 cm.; bright yellow; Or.; 1.
H. empetrifolium VI; 10 cm.; yellow; Or.; 1. (sh.)
H. ericoides VIII; 10 cm.; yellow; Sp.; 4, 6.
H. fragile VI; 10 cm.; yellow; Gr.; 1, 4, 6.
H. galioides VI; 50 cm.; yellow; N. Am.; 1. (sh.)
H. hircinum VII; 30 cm.; yellow; S. Eur.; 1. (sh.)
H. hirsutum VII; 30 cm.; light yellow; Eur., Si.; 1.
H. Hookerianum VII; 30 cm.; bright yellow; H.; 1. (sh.)
H. humifusum VII; 10 cm.; yellow; Eur.; 1, 2.
H. hyssopifolium VII; 20 cm.; yellow; S. Eur.; 6. L.
H. japonicum VII; 50 cm.; yellow; H., Jap.; 1. (sh.)
H. kalmianum VIII; 50 cm.; yellow; N. Am.; 1, 6. (sh.) P.
H. Kotschyanum VI; 5 cm.; light yellow; Or.; 4, 6.
H. leprosum VII; 10 cm.; yellow; Or.; 4.
H. linarifolium VIII; 30 cm.; yellow; W. Eur.; 6. P.
H. Mooserianum; hybrid, *calycinum* x *patulum;* yellow and red.

H. nummularium V-VII; 15 cm.; yellow; Al., Py.; 4, 6. Damp.
H. Olympicum VII; 20 cm.; yellow; Gr., Or.; 1, 4.
H. orientale VI-IX; 30 cm.; light yellow; Or.; 1, 4.
H. origanifolium VII; 8 cm.; light yellow; Or.; 4, 6.
H. patulum VI-X; 1 m.; bright yellow; Jap.; 1. (sh.)
H. perforatum VI-X; 40 cm.; yellow; Eur.; 1, 7.
H. poliphyllum VIII; 20 cm.; yellow; Or.; 1, 4.
H. prolificum VII; 50 cm.; yellow; N. Am.; 1. (sh.)
H. repens VI-IX; 10 cm.; yellow; Or.; 1, 4, 7.
H. reptans VII; 10 cm.; yellow; H.; 1, 4.
H. rhodopæum VII; 10 cm.; yellow; Ba.; 1, 4.
H. Richeri VII; 30 cm.; bright yellow; S. Eur.; 1, 4.
H. rubrum VII; 20 cm.; crimson red; Leb.; 1, 4, 6.
H. rumelicum VII; 15 cm.; yellow; Ba.; 1.
H. tomentosum VII; 40 cm.; yellow; Sp.; 1.
H. uniflorum VIII; 5 cm.; yellow; Gr.; 4.

HYPOCHÆRIS *Helvetica* (*uniflora*). A big yellow Composite on a naked 10 cm. high stem, flowering in the summer and adorning the high pastures of the Alps. Good loam. Seed.

HYSSOPUS *officinalis.* Strongly aromatic plant with medicinal virtues. The old Hyssop of the Bible.[17] Useful for barren and dry slopes. Dwarf shrub, with dark green foliage and indigo-blue flowers. Some vars. are *albas, grandiflorus,* and *ruber.* It is native of the dry country of S. Eur. and W. As. Division or seed. *H. angustifolius, aristatus,* and *cretaceus* are Asiatic and differ not much from the type. All do splendidly in hot places of the rockery, on dry walls, and barren slopes.

IBERIDELLA. See THLASI *rotundifolia.*

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[17] See *Plantes et Santé,* p. 162.

IBERIS. Candytuft. These are S. European Crucifers, dwarf or sub-shrubby, bushy or dense, good for sunny places in the rockery or border and for sunny slopes. Many are annuals and omitted here; some are bi-, tri-, or quadrennial like *I. Gibraltarica.* We have some three-year-old plants on our walls. Well drained, sunny places. Seed, cuttings, or division.

I. aurosica VII; 10 cm.; purple lilac; Dauphiné; 4.
I. conferta VI; 8 cm.; white; Sp.; 4.
I. corifolia IV; 15 cm.; white; It.; 1, 4.
I. garrexiana V; 20 cm.; pure white; Py., Sp.; 1.
I. Gibraltarica III-XI; 20 cm.; pinkish lilac and white; Sp.; 1, 4.
I. Jordani VI; 10 cm.; white; Or.; 4.
I. jucunda. See *Æthionema coridifolium.*
I. pruiti VII; 15 cm.; white; S. It.; 4.
I. saxatilis XI-V; 5 cm.; pure white; S. Eur.; 4.
I. semperflorens I-VIII; 25 cm.; white; S. Eur.; 1, 4.*
I. sempervirens III-VI; 20 cm.; pure white; S. Eur.; 1, 4. (Vars. *compacta, flore pl. grandiflora, Little Gem, nana, perfection, Snowflake, superba.*)
I. stylosa II, 8 cm.; pink; Ab.; 4. (Biennial.)
I. tenoreana III-V; 10 cm.; white; Ap., Ab.; 1, 4.
I. ventosicola III; 2 cm.; white; Mt. Ventoux (Provence); 4.

IMPERATORIA *Ostruthium.* A strong and medicinal Umbellifer with dark green aromatic foliage and white flowers growing in the moist places of European mountains; *I. angustifolia,* from Italy, has very narrow leaves. Both succeed in cool, moist places. Seed.

INCARVILLEA. Perennial Gloxinia. These are marvellous flowers introduced from Asia and especially from Yunnan some fifty years ago and one of the wonders of the garden. Some are rather big for the rockery but many are at their best in the alpine garden. The tuberous kinds (*brevipes, Delavayi, Farreri, grandiflora, lutea*) are to be kept rather dry through the winter when growing in a damp climate. They succeed in our alpine garden at 1000 m. alt., being covered in winter with deep snow. The only condition for their success is good drainage and rich, sandy humus. The fibrous-rooted kinds (*Olgæ, thalictrifolia, variabilis*) must have a very sunny situation. Seed.

I. brevipes VI; 20 cm.; deep carmine and pink; Ch.; 1, 6.
I. compacta VI; 25 cm.; rose purple and yellow; Tibet; 1, 6.
I. Delavayi VI; 30 cm.; clear carmine, purple, and yellow; Y.; 1, 6.
I. Farreri VI; 25 cm.; yellow; Y.; 6.*
I. grandiflora VI; 25 cm.; carmine, yellow, and purple; Y.; 1, 6.
I. lutea VII; 80 cm.; yellow; Y.; 6.*
I. Olgæ VIII-X; 1 m.; pink; Tu.; 1.
I. sinensis VIII; 30 cm.; bright pink; Ch.; 1, 6.
I. thalictrifolia VIII; 25 cm.; yellowish white; Ch.; 1, 6.
I. variabilis VII; 30 cm.; pink and yellow; Ch.; 1, 6. (Biennial.)

INULA. Strong Composites near to the Sunflowers, some of which are good for the border and want a deep loam, in sun or half sun; some are dwarf and suitable for the rockery. Division or seed.

I. acaulis VI; 5 cm.; yellow; Or.; 4, 6.
I. ensifolia VI-IX; 20 cm.; yellow; E. Eur., Ca.; 1, 7.

I. glandulosa VII; 50 cm.; orange yellow; Ca., H.; 1.
I. Helenium (*Elecampane*) VII; 1 m.; yellow; Eur., Ca., Si.; 1. Med.[18]
I. hirta VI-IX; 40 cm.; yellow; Eur.; 1, 7.
I. limonifolia VIII; 30 cm.; yellow (pure white foliage); Gr.; 1.
I. macrocephala VII; 60 cm.; yellow; Or.; 1.
I. montana VI-VII; 20 cm.; yellow; Eur.; 1.
I. Royleana VIII; 50 cm.; yellow; H.; 1.
I. salicina VI-VIII; 30 cm.; yellow; Eur.; 1, 7.

IRIS. As I have published one book especially devoted to the Iris[19] I do not now enter into too many details. We consider here only those species suitable for rock gardens. Everyone knows the rhizomatic Irises can be divided and that all can be raised from seed (slow germ.). Some are bog plants, others wall, rock, and sun-loving species. Few races of plants present so many different groups. A large number of garden varieties are excluded.

I. acoroides V-VII; 80 cm.; sulphur yellow; N. Am.; 2, 3.
I. aphylla IV-V; 25 cm.; dark lilac; S. Eur.; 1.
I. arenaria IV; 10 cm.; bright canary yellow; Cp., Tr., Ba.; 6.
I. Arizonica VI; 40 cm.; bright lilac; Arizona; 1.
I. asiatica; large flowering var. of *germanica* with rich blue standards.
I. attica III; 20 cm.; bright blue; Gr.; 1, 6.
I. aurea VII; 1 m.; bright yellow; H.; 1, 3.
I. Backeriana IV; 30 cm.; deep violet and yellow; Or.; 1.

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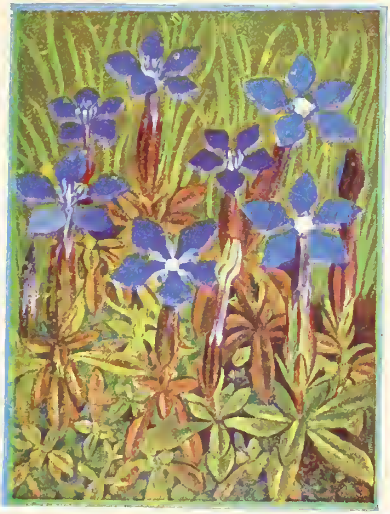
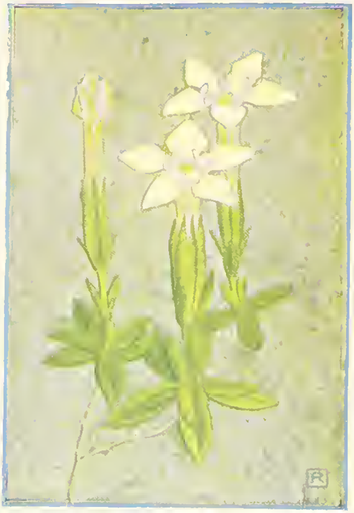
[18] *Inula Helenium* ought to be grown for its medicinal virtues. The Romans in the Cæsars' time used it for stomach sicknesses and at the present time great numbers of patients have been healed by its roots. We have the testimony of several hundred people benefited. See H. Correvon, *Plantes et Santé,* pp. 76-80.

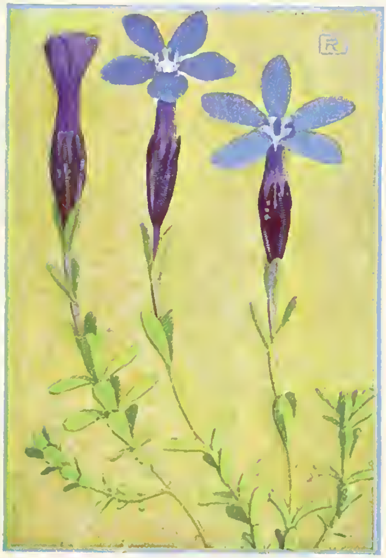
[19] H. Correvon and H. Massé, *Les Iris dans les Jardins,* Genève, 1907.



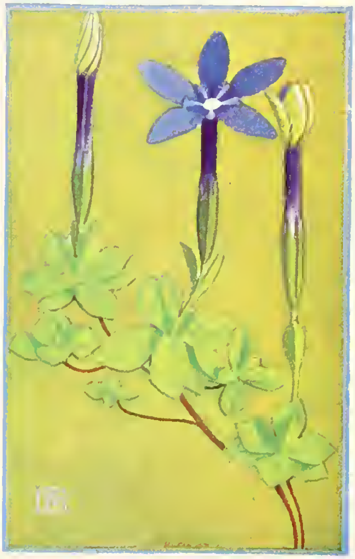
Gentiana verna



Gentiana verna var. chionodoxa



Gentiana bavarica



Gentiana brachyphylla

I. balcana V; 15 cm.; clear claret; Ba.; 1.
I. benacensis IV; 20 cm.; dark violet; S. Tyr.; 1, 4.
I. biflora IV; 30 cm.; purplish blue; Sp., Portugal; 1.
I. Billiotii VI; 1 m.; dark violet blue; Or.; 1.
I. bohemica VI; 25 cm.; lilac blue; E. Eur.; 1.
I. bosniaca III; 20 cm.; yellow; Ba.; 1.
I. bracteata VI; 40 cm.; yellow and lilac; Cal.; 1.
I. bucharica V; 40 cm.; white and yellow; Tu.; 1, 6.
I. Bulleyana VI; 60 cm.; rich violet; Ch.; 1.
I. Bungei is a dwarf *spuria* from Tibet.
I. cæspitosa IV; 20 cm.; lilac; Tr., Si.; 1, 6.
I. caroliniana VI; 40 cm.; lavender blue; N. Am.; 1.
I. caucasica IV; 15 cm.; yellowish; Ca., Or.; 1.
I. Cengialti V; 20 cm.; deep lilac blue; S. Tyrol.; 1, 4.
I. Chamæiris IV; 10 cm.; yellow or lilac; S. Eur.; 1, 4.
I. chrysographes V; 30 cm.; purplish violet; Ch.; 1.
I. cretensis; a *stylosa* with narrow foliage and bigger flower; 1.
I. cristata V-VI; 10 cm.; lilac blue; N. Am.; 6. P.
I. cuprea. See *I. fulva.*
I. cypriana; a cyprian form, white and brown, of *pallida.*
I. Danfordiæ III; 1·5 cm.; bright yellow; Or.; 1, 6.
I. Delavayi VII; 80 cm.; violet; Y.; 1.
I. dichotoma VII; 50 cm.; mauve; Ch.; 1.
I. Douglasiana VI; 40 cm.; cream, lavender, lilac, etc.; Cal.; 1.
I. ensata V-VII; 30 cm.; lilac; Ch., Jap.; 1.
I. Farreri VI; 25 cm.; blue and white; Ch.; 1.
I. flavescens VI; 60 cm.; yellow; Ca.; 1.
I. flavissima V; 20 cm.; golden yellow; Si.; 1.
I. florentina V; 60 cm.; white; S. Eur.; 1.
I. fœtidissima III; 60 cm.; livid blue; S. Eur., Or.; 2.
I. Forresti VI; 50 cm.; bright yellow; Ch.; 1.
I. fulva (*cuprea*) VII; 80 cm.; red brown; N. Am.; 1, 3.
I. furcata V; 15 cm.; bright purple; Or.; 1.
I. germanica; this old garden Iris can be used for barren slopes, roofs, and tops of the walls; a great many varieties.
I. gracilipes VI; 30 cm.; lilac; Jap.; 8, 9. P.

I. graminea V; 30 cm.; violet and blue; S. Eur., Or.; 1, 2.
I. Guldenstædtiana VI; 80 cm.; bright yellow; Or.; 1, 3.
I. hexagona VII; 60 cm.; light blue and white; N. Am.; 1, 3.
I. Histrio II; 15 cm.; lilac and white; Palestine; 1.
I. histrioides II-III; 15 cm.; lilac and gold; Or.; 1.
I. Hookeri IV; 40 cm.; bright lilac; N. Am.; 1.
I. italica IV; 25 cm.; dark violet; S. Eur.; 1, 4.
I. japonica VIII; 60 cm.; bright lilac; Jap. 1.* P.
I. juncea VI; 30 cm.; canary yellow; It., At.; 1.
I. lacustris VI; 5 cm.; bright lilac; N. Am.; 3, 6.
I. longipetala VII; 40 cm.; violet and gold; N. Am.; 1.
I. Loppii V; 25 cm.; bright lilac; Tyrol; 1, 4.
I. lutescens V; 30 cm.; light yellow; S. Eur.; 1, 4.
I. macrantha; a large *germanica* from the Orient.
I. Milesii VI; 60 cm.; pale lilac; H.; 1.
I. missouriensis V; 50 cm.; lilac violet; N. Am.; 1.
I. notha VI; 50 cm.; lilac with yellow; Or.; 1.
I. orchioides III; 30 cm.; yellow and white; Or.; 6.
I. orientalis V; 1 m.; bright yellow; Or.; 1, 3.
I. pallida VI; 50 cm.; pale blue; S. Eur., Or.; 1, 4.
I. plicata VII; 50 cm.; white and lilac; Or.; 1, 4.
I. pseudo-acorus V-VIII; 1 m.; bright yellow; Eur., Or.; 1, 3.
I. pumila IV; 10 cm.; lilac, blue, or yellow; S. Eur.; 1, 4.
I. pyrenaica VII; 30 cm.; dark blue and gold; Py.; 1, 7.
I. reticulata III; 10 cm.; deep blue and gold; Ca.; 1.
I. rhætica V; 30 cm.; yellow and dark brown; Engadine; 1, 4.
I. rubro-marginata IV; 10 cm.; pale purple; Gr.; 1, 4.
I. sambucina V; 40 cm.; yellow and claret; Or.; 1, 4.
I. setosa VI; 50 cm.; lilac; Si., Jap.; 1.
I. sibirica VI-VIII; 80 cm.; dark blue; Eur., Si.; 1, 3. (Vars. *alba, grandiflora, cœrulea, coreana, orientalis.*)
I. Sisyrinchium IV; 30 cm.; lilac and yellow; S. Eur.; 1.
I. spectabilis VI; 60 cm.; deep yellow and brown; Sp.; 1.
I. spuria VI; 50 cm.; lilac and yellow; E. Eur.; 1.
I. squalens VI; 40 cm.; violet and yellow; E. Eur.; 1.

I. stylosa (*unguicularis*) XI-IV; 30 cm.; blue and yellow; Med.; 1. (Vars. *alba* and *grandiflora.*)

I. tectorum VI; 40 cm.; lilac blue; Ch.; 1. (good for roofs)

I. tenuifolia IV; 1·5 cm.; lilac; Or., Si.; 1.

I. tridentata VII; 15 cm.; deep blue; N. Am.; 1, 3.

I. tuberosa III; 20 cm.; dark violet and black; S. Eur.; 6.

I. variegata VI; 60 cm.; yellow and brown; E. Eur.; 1.

I. verna V; 10 cm.; blue lilac; N. Am.; 1.

I. versicolor VI; 60 cm.; lilac and bright violet; N. Am.; 1, 3.

I. virescens IV; 40 cm.; lemon yellow; S. Eur.; 1, 4.

I. virginica VI; 60 cm.; lilac and violet; N. Am.; 1, 3.

I. Wilsoni VI; 80 cm.; deep purple and blue; Ch.; 1.

I. xyphioides VII; 60 cm.; dark violet and gold; Sp.; 1.

I. Xyphium VI; 50 cm.; purple violet; S. Eur.; 1.

ISATIS *alpina.* A rare, coarse, invading plant, from the Southern Alps and Apennines with bluish-grey Cabbage-like foliage and bright yellow flowers borne in broad, large panicles 30-40 cm. high. Not easy to keep in a garden. Must be sown and grown on sandy lime in well-drained soil, and in a cool position.

ISOPYRUM. This is a fine Ranunculus with graceful leafage and flowers. *I. thalictroides* is the European type, which is found in the woods of Savoy near Geneva and elsewhere; it is a stoloniferous little thing with pale green thalictrum-like leaves not exceeding 10 cm. high and small white flowers (IV-V). From Central and North Asia we get lately the beautiful *I. Farreri* (Tibet) with golden yellow flowers and bluish green foliage, and *grandiflorum* with big pure white flowers. *I. thalictroides* is good for underwoods and likes leaf mould and shade, while the Asiatic kinds want peat and a north side place in the rockery. Division or seed (slow germ.).

JANKÆA *Heldreichii.* The Ramondia of Mt. Olympus (Gr.). It has silvery leaves with a dense pelt of white down and makes rosettes just like the Ramondia. In the month of May it gives some small Gloxinia-like flowers, deep violet and purple. The plant is rare in gardens, but we grow it perfectly well on an east exposed tufa wall. Seed, or leaf-cuttings like *Begonia Rex.*

JANTHE *bugulifolia.* See CELSIA.

JASIONE. Slender and graceful Campanulads with globular heads of the type of *Phyteuma orbiculare.* They haunt the mountain regions of Europe and are propagated from seed.

J. amethystina, VI; 15 cm.; dark blue; Sp.; 1.
J. humilis VI-IX; 10 cm.; bright blue; Py., Sp.; 6.
J. Jankæa VII; 25 cm.; lilac; Or.; 6.
J. montana VI-IX; 25 cm.; light blue; Eur.; 1. P.
J. perennis VI; 20 cm.; blue; Eur.; 1.
J. supina VI; 10 cm.; light blue; E. Al.; 6.

JASONIA *tuberosa.* From North America, a yellow-spiked, stiff-leaved Composite, 35 cm. high, flowering in the summer. Good for barren, dry, and hot places. Seed.

JEFFERSONIA *diphylla* (*binata*). Twin-Leaf. A very curious North American Berberid which grows in peat-soil underwoods. It has divided, shield-shaped leaves and in May little white fugitive flowers on a naked 30 cm. high stem. The seed capsules are very elegant, in the form of a pipe.

J. dubia from Manchuria has blue-violet flowers. Both like rich leaf mould and peat and are shade-loving. Division or seed (slow germ.).

JUNIPERUS. Juniper. Some of these conifers are suitable for big rock gardens; their berries are resinous and aromatic and our mountaineers use them for medicinal purposes. *J. nana* (80 cm.-1 m.) is the alpine form of the common Juniper and belongs to the Northern Hemisphere, while *J. sabina* (the Savin) is a low, creeping shrub, very dwarf in its really alpine form, which is strongly aromatic and covers large spaces on the granitic Alps. Both like the full sun and are propagated by cuttings (slow rooting) or seed (slow germ.).

JURINEA *depressa.* Musk-Rose. An Oriental blue Thistle with hemispheric head, smelling like *Rosa moschata;* it grows on sunny hills in the alpine regions of Greece and Anatolia and is a nice thing for the rock garden. Sunny situation. Seed. We have received from the Atlas (1850 m. alt.) *Jurinea humilis,* which flowers well here; it is five cm. high, and has a mauve-coloured head; well-drained soil and sun. Seed.

KAUFMANNIA (CORTUSA) *Semenowii.* A rare Primulad from the Turkestan mountains with yellow flowers on 20 cm. high stem; orbicular reniform leaves on slender stalk. Half-shady situation and good spongy soil. Seed.

KERNERA (COCHLEARIA) *saxatilis.* Thin saxatile Crucifer with pure white flowers haunting small fissures in the limestone rocks of European mountains (V-VII). The *K. Boissieri* is its Spanish form, and has narrower leaves. Both have greyish foliage, making nice dense rosettes. Seed.

KIRENGESHOMA *palmata.* This is a Japanese splendour, but could not our good friends of the Far East give it another name? This beauty deserves some other appealing appellation! It is a rather bushy plant growing to 60 cm. with a black, dark shining stem set with noble, handsome, green, and palmate leaves. In August and September the flowers come, waxy yellow (of a yellow unique in our gardens), very conspicuous and large, disposed in loose clusters at the top of the stem. It wants a rich soil and a shady position. Seed or division.

KITCHINGIA *uniflora.* A dwarf Crassulacead from the Madagascar mountains which is not easy to grow here; we have it in a cool house but it flowers seldom. It is quite creeping and dwarf, has spatulate-crenate foliage and relatively large, waxy, light rose flowers similar to those of the *Linnæa borealis.*

KNAUTIA. See SCABIOSA.

LACTUCA *perennis* is a large glaucous-grey Dandelion, very glabrous, with a 30 cm. high-branched stem bearing some relatively large heads of pale china blue, with curious mauve and pink-shaded flowers. It is one of the glories of the rocky limestone regions of the S. Eur. mountains, and flowers all the summer through. I once found, in the Queyras, a beautiful form with pure white flowers which is truly reproduced from seed. Dry, sunny place in the rockery. Seed.

LAMIUM. Dead Nettle. Some of these Labiates are interesting for the rock garden: *L. albo-maculatum* with white maculated leaves and pink flowers, and *L. orvala* from E. Eur. with 40-50 cm. high, thick-leaved stem bearing big port-wine red flowers. Half shade. Seed or division.

LANCEA *tibetica.* Dwarf, creeping Scrophulariads from the mountains of Central Asia bearing violet-blue flowers on 10 cm. leafy stems, arising from dense rosettes of toothed leaves. It never seeds with us and must be divided. Sun and peat.

LASERPITIUM. Big aromatic Umbellifers with more or less finely divided foliage, white or light pink flowers in large umbels or coarse panicles. They want ample space and are effective in a big and sun-exposed rock garden. Prop. only from seed (slow germ.). *L. gallicum, Gaudini, Siler* have finely cut and thin foliage and belong to S. Eur., while *latifolium* from the Eur. mountains and *Nestleri* from the Pyrenees have large segmented leaves. *L. Halleri* (*Panax*) has the thinnest leaves and is lime-shy, growing only on the granitic Alps.

LATHYRUS. Pea. The type of this big genus is the Everlasting Pea, *Lathyrus latifolius,* but there are numerous others which are dear to the rock gardener. The most beautiful of all is certainly the Campo Pea (*L. splendens*). I saw it in a California canyon climbing over bushes of Ceanothus and

Diplacus; what splendour! The slender stems, the narrow and elegant leaves, and the bright crimson flowers formed a picture I shall never forget! And our modest *L. pratensis* with its bunches of bright yellow flowers must not be neglected, however. All are easily reproduced from seed. The climbing species are indicated by (cl.). See also OROBUS.

L. californicus VII; 50 cm.; light pink; Cal.; 1'. (cl.)
L. cirrhosus VI; 1 m.; rose; Sp., Py.; 1.
L. decaphyllus VII; 60 cm.; purple; N. Am.; 1. (cl.)
L. grandiflorus VI-X; 1 m.; bright crimson; Or.; 1. (cl.)
L. heterophyllus VIII; 1 m.; rose; Eur.; 1.
L. incurvus VII-IX; 60 cm.; lilac and violet; Eur.; 1.
L. latifolius V-X; 1 m.; carmine and rose; S. Eur.; 1. (cl.) (Vars. with pure white and light pink flowers.)
L. maritimus VII; 40 cm.; rose and purple; Eur., As., N. Am.; 1.
L. ornatus VII-IX; 25 cm.; purple; R. M.; 1.
L. palustris VI; 60 cm.; bright carmine; Eur.; 1, 3.
L. polyphyllus VI-IX; 1 m.; bright crimson; Cal.; 1.* (cl.)
L. pratensis VII-IX; 50 cm.; gold yellow; Eur.; 1.
L. pubescens VI-VIII; 1 m.; violet blue; S. Am.; 1.
L. roseus VII; 80 cm.; light rose; Or.; 1'. (cl.)
L. rotundifolius VII; 60 cm.; bright red; Or.; 1.
L. Sibthorpii VI; 50 cm.; mauve; Ba.; 1.
L. splendens VII-IX; 1 m.; bright crimson; Cal.; 6.* (cl.)
L. sulfureus VIII; 1 m.; pinkish yellow; R. M.; 1.
L. sylvestris VII; 1 m.; greenish red; Eur.; 1.

LAURENTIA *tenella.* A small and dwarf Lobella with violet-blue flowers, not exceeding 5-8 cm. in height, which grows in the sphagnoid marshes of S. Eur. *L. Michelii* is still smaller. Both succeed in our sphagnum bed at Floraire and even in the bog. Seed.

LAVANDULA. Lavender. Crossing the Lavender slopes is one of the most pleasurable experiences of climbers in the Southern Alps, for the delicious odour of the sweet herb persists on the clothing to remind them, after returning home, of the bright, sunny regions they travelled over. The old Athenians, the Egyptians, the Phœnicians, and the Romans esteemed this fragrance very highly, and there is, indeed, a Lavender literature. The commercial preparation of the perfume is well developed in Southern France. There are several kinds of Lavender, all from the Mediterranean countries. The most precious, *L. delphinensis, L. vera* (*officinalis*), and *L. spica* are mostly grown. The Lavenders must be given a sunny corner of the garden, even as edgings or in borders, or a dry, sunny, exposed place in the rock garden. Cuttings, division, or seed.

L. delphinensis VII; 30 cm.; bluish lilac; S. W. Al.; 1.
L. dentata VII; 40 cm.; lilac; Med.; 6.*
L. lanata VIII; 40 cm.; dark blue; Sp.; 1.
L. multifida VIII; 50 cm.; dark violet; Med.; 6.*
L. pyrenaica; the Pyrenean form of *vera.*
L. spica (*latifolia*) V-VII; 40 cm.; violet purple; Med.; 1.
L. Stœkas VI; 40 cm.; reddish violet; Med.; 1. P.
L. vera (*officinalis*) VII-IX; 40 cm.; lilac blue; S. Eur.; 1. (Numerous vars. *alba, compacta,* etc.)

LEDUM. Arctic and boreal shrubs belonging to the Heaths which must be grown in peat mixed with turf mould and granitic sand. *L. glandulosum* from arctic America; *L. Labradoricum* (Labrador Tea) from the volcanic regions in Labrador; *L. latifolium* from N. Am. and *L. palustre* from the whole boreal region are all nice evergreen shrubs, 60 cm.-1.50 m. high with white flowers; they want cool and fresh situations in the rockery. Seed, division, or cuttings.

LEIOPHYLLUM *buxifolium.* An ericaceous species from N. Am. is a very minute shrub with evergreen, small, shiny leaves and small pinkish white flowers. Same culture as LEDUM.

LEONTICE. A curious Berberid, nearly related to Bongardia and Caulophyllum coming from desert countries in the Orient and more interesting than showy. They have thick, fleshy roots and are in a resting state through the summer. Boissier in *Flora Orientalis* describes five different species, but four only are grown in gardens: *L. Alberti, altaica, chrysogonum,* and *Leontopetalum,* with whitish or yellowish flowers resembling Epimedium. They want a sunny and dry position. Seed (slow germ.).

LEONTOPODIUM. Edelweiss or Flannel-Flower. This plant has been idealised by poets and novelists and the legend of its rarity and of its sacred character sends many alpine climbers to their death every year. How often do we read in the newspapers that some young man has been killed when searching for Edelweiss! This plant is wrongly considered as typical of the alpine flora, for it is neither really alpine nor even Swiss. It grows over the whole Asiatic Continent as well as on all the European limestone mountains (except the Caucasus!); and in Eastern Siberia is such a common weed that the road workers have to fight the masses of its white heads. About the stupid popularity of this plant Farrer says: "Were it not for the idiotic superstition and the persistent rubbish of romance that are gathered round this species, no one would refuse credit and even affection to its wide woolly stars of silver which, in the gardens as on the wild hills, take special value if grown in the moraine among clumps of violet-and-gold *Aster alpinus.* It is often a really beautiful sight, covering the highest lawns of the Alps with tufts of grey, and galaxies of pale flannel starfishes, as common daisies cover an English tennis-court. But, to call this plant an alpine, to imagine it rare and precious and difficult of attainment, this is to provoke the meekest into exposure of a fraud so impudent and foolish that thereby the merits of Edelweiss itself are unduly shamed and darkened."

There are as many forms of Edelweiss as there are mountain ranges where it grows. My friend, Dr. Beauverd of the Botanic Society of Geneva, has published more than 50 different kinds and, I think, when he sees the Edelweiss beds on our Jurassic garden (La Chèvrerie) any May he will be able to quadruple the series of his new species; we have there such a large variation that almost each plant is different from any other. The seeds all were *L. alpinum* from different regions. Once in the famous Val d'Arrasas in the Spanish Pyrenees, I found a field of Edelweiss with 30 cm. high stem and showy white flower which I called *aragonensis;* in the Cogne Valley (Italy) I found a plant with very large involucres and named it *macrocephalum;* and, in a seedling in our own garden here, we once found a very large specimen with still broader involucre which we named *florariensis*. But all these names were given from a gardener's point of view and we do not pretend to have really new species.

L. alpinum is the general type; if grown on limestone and a well-drained soil and in a sunny place it keeps and even accentuates the whiteness of its flannel involucres. The actual flower of Leontopodium is small and not showy, the unique attraction being in the bracts of the involucre sustaining the head of flowers. Now, place the plant in other conditions; on peat, for instance, it loses its whiteness and takes another aspect. In Siberia the plant has smaller involucres and is not so woolly as ours despite the statements of some horticultural papers which claim *L. sibiricum* as being the largest of all! *L. altaicum, Hymalayense, leontopodioides, lindavicum, sikkimense,* and *thibeticum* are only local forms and lose their characters if grown in the same condition. *L. japonicum* is a real type but a very ugly one, the bracts being small and green; in the high mountains of Central China the involucre is much thicker and woolly, therefore more beautiful. I once saw some plants brought from Manchuria which had yellowish bracts. The culture of the Edelweiss is easy in an open and sunny, exposed corner of the rockery. Division or seed.

LEPIDIUM. See HUTCHINSIA.

LEPTINELLA. See COTULA.

LEUCANTHEMUM. See CHRYSANTHEMUM.

LEUCOCRINUM *montanum.* Sand-Lily. A rare liliaceous plant from the Rocky Mountains and California making a tuft of soft leaves on a very short rootstock; flowers pure white, fragrant, in a central cluster from the ground, the pedicels arising directly from the rootstock. Full sun in a sheltered spot; light, rich, and sandy soil. Seed (slow germ.).

LEUCOCYCLUS (ANACYCLUS) *formosus.* A small shrub of the Compositæ (20-30 cm. high) found by Boissier on the Cilician Taurus; the whole plant is very downy white and bears Daisy-like flowers with white ligules and a golden-yellow centre. A sunny, dry corner in the rockery. Cuttings or seed.

LEUCOJUM. This well-known Amaryllid is grown in every garden and is the first salutation of the spring after the snow is away. In our S. European mountains *L. vernum* (Snowflake) is one of the best-loved flowers and crowds of townspeople take a trip into the country to pluck it. It has been cultivated in English gardens since the sixteenth century and was called "The Bulbous Violet" by old

Parkinson in his *Paradisus.* Mr. W. Brockbank[20] has given us a monograph of Leucojum. They all like a moist, fresh, deep soil and half-sunny position. Seed (slow germ.).

L. æstivum IV-VI; 50 cm.; white; Eur., Or.; 1, 7.
L. (*Acis*) *autumnale* X; 15 cm.; rose; S. Eur., At.; 6.
L. carpathicum IV; 15 cm.; white; Cp.; 1, 6.
L. grandiflorum IV; 20 cm.; white; Sp., H.; 1, 7.
L. Hernandezi VI; 50 cm.; white; Baléares; 1.
L. hyemale; IV; 1·5 cm.; S. Eur.; 1, 6.
L. longifolium IV; 20 cm.; white; Co.; 6.
L. pulchellum IV; 30 cm.; white; Co.; 1, 6.
L. trichophyllum IV; 15 cm.; white; Sp.; 1, 6.
L. vernum II-III; 15 cm.; white; Eur.; 1, 2, 7. (There is a double var. of *vernum* which is very rare.)

LEUCOPHYTA (Calocephalus) *Brownii.* Silver-Coral. A kind of Helichrysum from Australia, making dense tufts of silver-white shining foliage, 10-15 cm. high, creeping over the soil and covering large spaces. Flowers unshowy, greyish white, in small heads; but the effect of the large shining masses is beautiful; not quite hardy here; full sun, dry situation. Cuttings or seed.

LEUCOTHŒ. Sweet-Bell. Small shrubs near to Andromeda growing in North America and in Japan, flower in clusters. Peat. Prop. from seed and cuttings.

L. acuminata VI; 60 cm.; white; N. Am.; 5.
L. axillaris V; 80 cm.; white; N. Am.; 5.
L. Catesbæi V; 1 m.; white; N. Am.; 5.
L. racemosa V; 1.50 m.; white, N. Am.; 5.

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[20] *Gard. Chron.,* 15 March, 1884, p. 340.

LEUZEA *conifera.* A Composite near to Centaurea, growing 10 cm. high, with big, egg-shaped purple rose flower heads in a conical globulose involucre; VII; full sun; S. Eur.; Mr. Hay, superintendent of the Parks of London, says (*Gard. Chr.,* July, 1914, p. 50) that the plant becomes very old, as he knows of a large group of *L. conifera* half a century old in a Banffshire garden. *L. macrocephala* was sent to Floraire from the Middle Atlas in 1894; it has a much bigger head. Seed.

LEWISIA. Bitter-Root. These Portulacs belong especially to Western and Northern America. They are more interesting than splendid, and are fleshy, perennial, low herbs with thick roots or a corm; the multi-petaled flowers are borne on short scapes. I saw some in the Columbia River Valley where they grow abundantly in rocky situations exposed to the hardest sun. They all succeed here on a sunny bed grown in long drain-pipes. *L.* (*Calandrinia*) *Columbiana,* from Oregon and Vancouver, has yellow-reddish flowers. *L. Cotyledon,* a Californian, has thick spatulate leaves and pink flowers; *L. Finchii,* a Californian too, has small white flowers; *L. Howelli,* from California and Oregon, has undulate foliage and yellow flowers, striated with brown; *L. Leana,* same origin, has red flowers; *L. nevadensis* (Cal.) has white flowers; *L. oppositifolia,* from California and Oregon, has white flowers; *L. pygmæa* is very small with pink flowers. *L. rediviva* is the oldest known in gardens and has the most showy flowers; the leaves die away, but it miraculously revives and the satiny pink flowers come up in May and June and remain many weeks. *L. triphylla* is a very small plant from the Rocky Mountains with white flowers; *L. Tweedyi* has large leaves and pink-rose flowers. Mr. Purdy at Ukiah (Cal.) is the great man for these rare plants. He cultivates them in sandy beds exposed to the sun, and, as I believe, does not water them. Seed.

LIATRIS. Gay-Feather. These American Composites are hardy herbaceous with rigid, alternate, entire leaves and have handsome rose-purple flowers (spicate, racemose, or panicle-cymose) appearing late in summer. They like a light, open soil and a sunny situation. They are rather stiff and big for the rockery, but may be planted in the background or in the borders. The following species are cultivated, all from Central or Southern United States: *L. callilepis, cylindracea, dubia, elegans, gracilis, graminifolia, macrostachya, montana, punctata, pilosa, pycnostachya, scariosa, spicata, squarrosa,* and *tenuifolia;* some white vars. of *graminifolia, punctata,* and *scariosa.* Division and seed.

LIBERTIA *formosa* of South America, *grandiflora* and *ixioides* from New Zealand are Irids with white flowers liking a rich, deep soil in a well-sheltered spot. Seed (slow germ.).

LIGULARIA. Giant Groundsel. A big Senecio of Asiatic origin with architectural aspect and yellow flowers; suitable for big rockeries and borders.

Those grown in gardens are: *L. altaica, macrophylla, sibirica, speciosa, stenocephala, Tschihantanica,* and *turkestanica.* They want a good, deep garden soil. Division and seed.

LIGUSTICUM. Stiff Umbellifers with thin foliage and Carrot-like flowers useful for giving greenery to barren places in the garden. Seed (slow germ.).

LILIUM. The Lilies are the Kings of the gardens, the Rose remaining their Queen. Who may adequately describe their beauty and their value both for the rock garden and the border? Lilies generally prefer the peat bed or the Rhododendron corner; but most of them are splendid ornaments in the rockery, and what beauty they give to the underwoods! In the earliest years of my garden memory (1860-1870) the gardener had the Madonna Lily, the red Martagon, and the Orange Lily. We were quite satisfied with them. Now, we have special nurseries for Lilies and they have their own literature. We will not here enter into the vast domain of the Asiatic and the North American Lilies, limiting our descriptions to the European mountain species. They indeed are numerous and beautiful enough!

The Orange Lily (*L. croceum*) is a child of the rocky and sunny slopes in Southern Europe. Its large flaming flowers are the joy of our eyes when crossing the Alps and descending to Italy or even when, from Geneva, we ascend to Chamounix. Our forefathers had it in their gardens in large patches. It grows 1-1.30 m. in good soil and has no other want than a sunny, well-drained place. *L. bulbiferum* is its brother of Central and Eastern Europe; it is somewhat smaller and has bulbils at the base of the upper leaves. *L. Chaixii,* of the Maritime Alps, is a diminutive of Croceum, with light yellow flowers on 20-30 cm. high stems.

The Martagon group is the brightest and the finest of our European Lilies. The type *L. Martagon,* with its leaves in whorls, its pendant dull pink, and disagreeable smelling flowers, has been in gardens for hundreds of years. It belongs to the mountain regions of Central and South Europe, Caucasus, and Siberia, where it haunts the pasturages and the underwoods. It is of easy culture: deep leaf mould and half shade. The vars. *album* and *album plenum* are very popular in English and Irish gardens where I have seen some splendid specimens. The late Max Leichtlin introduced the var. *dalmaticum* with dark brown flowers from Montenegro some 50 years ago. There is, in the Southern Austrian Alps, a beautiful Martagon with brilliant red flowers called *L. carniolicum;* and in the Bosnian mountains a yellow one, which is a diminutive of *pyrenaicum* with light yellow flowers called *L. Jankæ;* near to it is *L. albanicum* from the W. Balkans, a taller plant with the same yellow Martagon flowers dotted with black. Then in Macedonia and in Greece we find the famous *L. chalcedonicum* with bright scarlet flowers and in the Attic mountains is *L. Heldreichii,* very near to the former. In the Pyrenees, under the shade of the dark forests, grows the yellow Martagon *L. pyrenaicum* with bright yellow flowers having red anthers. But the brightest of all is certainly the red Martagon *L. pomponium* which you may see enflaming the heights of the Maritime Alps. When for the first time I saw these masses of crimson spikes adorning the dark, stony, and barren slopes of the Var Valley I was indeed enchanted. It is the gem of the European Lilies and the most brilliant of them all, even more so than the famous *chalcedonicum.* It blooms in our garden in May and June and wants only a sunny place and well-drained ground. All the Lilies are easily propagated from seed (slow germ.).

LINARIA. Toadflax. This is a vast genus, especially abounding in Southwestern Europe; a large number are annual or biennial but the mountainous ones are generally perennial. Some, as *repens* and *vulgaris,* for instance, are dangerous weeds, although attractive in flower. All like the wall or the sunny, exposed rockery and are prop. by division or seed. Those marked (inv.) are invading kinds.

L. æquitriloba V-IX; 2 cm.; pale violet; Co.; 1, 4. (inv.)

L. alpina IV-XI; 8 cm.; violet with orange; Eur.; 1, 4, 6. (Vars. *alba, concolor,* and *rosea.*)

L. anticaria VI-X; 20 cm.; pale lilac; Sp.; 4, 6. (Biennial.)

L. cilicica VII; 25 cm.; lilac and white; Or.; 1, 4. (inv.)

L. Cymbalaria. Kenilworth-Ivy. IV-XI; 8 cm.; lilac and gold; Eur.; 4. (inv.) (Vars. *alba, grandiflora, rosea.*)

L. dalmatica VI; 40 cm.; yellow and brown; E. Eur.; 1.

L. genistifolia VII; 80 cm.; bright yellow; Or.; 1.

L. glacialis VI; 15 cm.; lilac and gold; Sp.; 4, 6.

L. hepaticæfolia VI-X; 2 cm.; lilac; S. W. Eur.; 1, 4. (inv.)

L. italica VI; 50 cm.; bright yellow; S. Eur.; 1. (inv.)

L. macedonica VII; 80 cm.; yellow; E. Eur.; 1.

L. origanifolia V-IX; 15 cm.; violet and lilac; E. Eur.; 4.

L. pallida VI; 5 cm.; lilac and gold; Ap., Ab.; 4. (inv.)

L. petræa; a Jurassic erected form of *alpina.*

L. pilosa VI-XI; 10 cm.; lilac and violet; Ap., Ab.; 4. (inv.)

L. purpurea VII; 60 cm.; dark violet; Med.; 1. (inv.)

L. repens (*striata*) V-X; 30 cm.; lilac and white; S. Eur.; 1. (inv.)

L. satureyoides VII; 15 cm.; pale violet; Sp.; 4, 6.

L. triornithophora VI-XI; 30 cm.; rich violet; Sp.; 1, 4.

L. tristis VII; 20 cm.; yellow and brown; Sp.; 4. (Biennial.)

L. villosa VII; 10 cm.; lilac and violet; Sp., At.; 4, 6.

LINDELOFIA *spectabilis.* A bushy Boragewort with rough foliage and deep blue flowers, 40-50 cm. high (V-VIII); Himalayan origin. There is a var. *Afghanica* that is better than the type; rich, deep, and open soil. Seed.

LINNÆA *borealis.* Twin-Flower. A little creeping shrub sending all about some slender shoots sometimes 1 m. long, with opposite orbicular crenate leaves; the flower stems (5-8 cm.) bear two delicate white (pink inside), sweet-smelling, campanulate, and nodding flowers; the carpet they make in the Engadine woods is one of the most charming sights in these mountains. It grows in the E. Al. and in N. Eur. in the moss of the woods. In N. Am. it is replaced by a bigger form, *L. canadensis* (*Americana*), larger in all its parts and of brighter crimson in the bells. I saw it carpeting the soil under a 100 m. high Douglas Fir in the north of Seattle, an apposition of the dwarfest shrubs with the biggest trees! We tried long and unsuccessfully to acclimatise Linnæa, and it is only quite recently that we really captured it. It is produced easily enough by cuttings made in August, but the culture after they have rooted is not easy. It is lime-fearing, and we keep it under the shade house in pure peat. It can be layered too, but the cutting method is better. Seeds are rare.

LINUM. Flax. Glorious flowers all about the mountains of Europe and especially in the Mediterranean region. All the species like a sunny situation; poor, light soil, with drainage; most of them are glorious in the rock garden. Seed.

L. alpinum V-IX; 15 cm.; light blue; Eur.; 1. (Vars. *album* and *atropurpureum.*)
L. arboreum VII; 1 m.; bright yellow; Crete; 1.*
L. aretioides VII; 5 cm.; bright yellow; Or.; 1, 4.
L. arkansanum VI; 15 cm.; yellow with pink; N. Am.; 1.
L. austriacum; an Austrian bigger form of *alpinum.*
L. Balansæ VI; 20 cm.; yellow; Or.; 1.
L. campanulatum (*flavum*) VI-X; 30 cm.; light yellow; S. Eur.; 1.
L. capitatum V-VIII; 30 cm.; bright yellow; S. and E. Eur.; 1.
L. carnosulum VI; 5 cm.; azure blue; Leb.; 4.
L. collinum VII; 15 cm.; pure blue; S. Eur.; 1, 4.
L. compactum VII; 5 cm.; lemon yellow; N. Am.; 1, 4.
L. elegans VIII; 25 cm.; yellow; Gr.; 1.
L. extra-axillare VI; 20 cm.; blue; Cp.; 1.
L. hirsutum VI; 30 cm.; lilac; Or.; 1.
L. hologynum VI; 25 cm.; azure blue; Or.; 1.
L. humile VII; 10 cm.; blue; Or.; 1.

L. iberidifolium VI; 10 cm.; yellow; Or.; 1, 4.
L. Julicum V-VI; 15 cm.; azure blue; E. Al.; 4.
L. leucanthum VII; 15 cm.; pure white; Gr.; 1, 4.
L. Lewisii VII; 25 cm.; blue; N. Am.; 1.
L. maritimum VII; 20 cm.; yellow; S. Eur.; 1.
L. monogynum VII; 30 cm.; white; N. Z.; 1.
L. montanum; a Jurassic big form of *alpinum.*
L. Muelleri VI; 30 cm.; yellow; Sardaigne; 6.*
L. narbonense V-X; 50 cm.; pure blue; S. Eur.; 1.
L. Olympicum VI; 25 cm.; violet; Gr.; 1.
L. orientale V; 20 cm.; bright yellow; Or.; 1, 4.
L. perenne V-XI; 50 cm.; azure blue; Or., As.; 1. (Vars. *album, roseum,* and *sibiricum.*)
L. salsoloides (*suffruticosum*) V-IX; 20 cm.; light rose; S. Eur.; 1.
L. sulfureum VII; 25 cm.; light yellow; Or.; 1.
L. tenuifolium VI-X; 20 cm.; light mauve; S. Eur.; 1.
L. viscosum VII; 25 cm.; violet rose; S. Eur.; 1.

LINOSYRIS *vulgaris.* A curious Composite with a bright yellow flower in terminal heads destitute of ligules, which grows on sunny and sandy hills in S. Eur. and wants a dry situation and light soil. *L. punctata* from Siberia is a larger one. Division or seed.

LIPPIA *canescens* (*repens*). A trailing dwarf lilac mauve Verbena from Chili, blooming all summer, carpeting rapidly large spaces of ground. It likes warm and sandy places. Used as a lawn grass substitute in the extreme Southern United States. Division.

LIRIOPE *spicata* (*graminifolia*). A Japanese liliaceous plant with tufts of grass-like foliage and spikes of small white flowers; they use it in the

South as grass under trees and as edging in shady places. Hardy here, but suffers from long winters.

LITHOSPERMUM. Gromwell. Dwarf shrubs, herbaceous or creeping Borageworts with flowers of sky blue or golden yellow; one of the glories of our rockeries and walls. The blue kinds form large patches of bright blue mixed with pink, and the yellow ones are often splendid sheets of colour. I found *L. canescens* once near St. Louis, Mo., on the slope near the road and was enchanted. It was an orange-yellow tuft with greyish foliage resembling a minute and dense *Asclepias tuberosa.* And once, over the mountains of Vicenza, Italy, I crossed fields of the sky-blue *L. graminifolium* mixed with the pink *Linum viscosum* and the dark Serapias. That picture can never be forgotten! Some of the Lithospermums want sun and stone; some can be used for edging, or planted on the top of the wall; others are woodland plants (*L. purpureo-cœruleum* and *Zolingeri*). What a glorious sight on the Central and Aragonian Pyrenees are the fields of *L. Gastoni* emerging from the limestone *pierrier* and forming dense tufts of sky-blue flowers in such dense masses that the peasants themselves go out to worship! All the Lithospermums may be grown from seed and cuttings, and some from division.

L. aureum V; 15 cm.; golden yellow; Gr.; 4, 6.*
L. canescens VII; 15 cm.; bright orange; N. Am.; 6.
L. Frœbeli; garden hybrid, near to *intermedium.*
L. fruticosum X-II; 30 cm.; dark blue; S. Eur.; 6.*

L. Gastoni VI; 20 cm.; bright sky blue; Py., Sp.; 4, 6.

L. graminifolium VI-VII; 15 cm.; azure and pink; E. Al., It.; 4, 6.

L. hirtum VII; 30 cm.; yellow; N. Am.; 6.

L. intermedium; hybrid, *graminifolium* x *petræum.*

L. Kotschyi VII; 15 cm.; azure blue; Or.; 4, 7.*

L. longiflorum VII; 30 cm.; light yellow; N. Am.; 6.

L. multiflorum VII; 30 cm.; clear yellow; N. Am.; 6.

L. oleæfolium VI-IX; 8 cm.; pink and azure; Py., Sp.; 4, 6.

L. (*Moltkia, Echium*) *petræum* VII; 20 cm.; azure and pink; E. Eur.; 1, 4.

L. prostratum VI; 10 cm.; indigo blue; S. W. Eur.; 5, 6. P. (Vars. *album* and *heavenly blue.*)

L. purpureo-cæruleum V; 25 cm.; deep blue and pink; Eur.; 1, 2.

L. rosmarinifolium VI; 10 cm.; indigo blue; S. It.; 4, 6.*

L. Zahni VII; 15 cm.; sky blue; Gr.; 4, 6.*

L. Zolingeri VI; 25 cm.; deep blue; E. Eur.; 2.

LLOYDIA *alpina* (*serotina*). A small bulbous Liliad with threadlike stems and leaves and little pinkish-white cups, which grows on the northern and damp slopes of the Alps and boreal regions. It flowers in May and wants shade and coolness in a well-drained spot on the rockery. Seed.

LOBELIA. This is a brilliant genus which occurs on all continents and gives us nice things for the rock garden. In North America the Cardinal Flower (*L. cardinalis*) covers acres of damp soil and enlightens the country. On the high regions of the Ruwenzori and Kilimanjaro, in Central Africa, there grows a big Lobelia several metres high, looking like strange trees. My friend, the explorer and great traveller, V. Sella, brought me large and beautiful photographs and seeds. They are the strangest things imaginable and carry the mind far, very far into the prehistoric period of plant life. In New Zealand the minuscule, *L. linnæaoides,* with its myriads of white stars, carpets the soil in the mountain marshes. Seed, cuttings, or division.

L. cardinalis VII-IX; 1 m.; bright scarlet; N. Am.; 1, 3.
L. Dortmanna VII; 40 cm.; blue; Eur.; 3, 6.
L. fulgens VII; 1 m.; bright scarlet; Mex.; 1, 3.
L. Kamstchatica VI; 30 cm.; violet blue; Si.; 1.
L. linnæaoides VI; 3 cm.; white and lilac; N. Z.; 9, 10.
L. syphilitica VII-X; 80 cm.; blue; N. Am.; 1, 3. (Vars. *alba* and *rosea.*)
L. Tupa VIII; 1 m.; scarlet; Chili; 3.*
Numerous hybrids of *cardinalis* with *fulgens* and *syphilitica* (Gerardi, Rivoirei, etc.).

LOISELEURIA. See AZALEA.

LONICERA. Shrubby or climbing plants. Those belonging to the Chamæcerasus section are bushy and good for big rock gardens. Prop. seed, offsets, or cuttings. *L. nitida* and *pileata* are evergreen.

L. Alberti VI; 60 cm.; light rose; Tu.; 1. (Fragrant.)
L. alpigena VI; 80 cm.; brown red; Eur., Si.; 1, 2.
L. cærulea VI; 1.50 m.; whitish (blue berry); Eur.; 1, 2.
L. nigra VI; 1.50 m.; whitish (black berry); Eur.; 1, 2.
L. nitida VII; 1 m.; white; Ch.; 1, 2. (Fragrant.)
L. pileata VI; 1 m.; white; Ch.; 1, 2. (Fragrant.)
L. pyrenaica V; 60 cm.; white (red berry); Py.; 1, 4.
L. rupicola VI; 50 cm.; lilac; Ch.; 1, 4. (Fragrant.)
L. syringantha VI; 60 cm.; carmine; Ch.; 1. (Fragrant.)
L. tibetica VI; 50 cm.; rose; H.; 1.
L. tragophylla V; 60 cm.; yellow; Ch.; 1.

LOTUS. Lady's Fingers or Gem Trefoil. Dwarf Pea Flowers, good for summertime; we are glad to have them in August-Sept. when many other plants are destitute of charm. All want sun, but *L. siliquosus* is a real bog plant. Seed.

L. corniculatus V-X; 15 cm.; yellow and red; Eur.; 1, 4, 7.
L. creticus V; 25 cm.; yellow; S. Eur.; 1.
L. cytisoides V; 40 cm.; yellow; Med.; 1.*
L. (tetragonolobus) siliquosus VII-IX; 20 cm.; sulphur yellow; Eur.; 3.

LUBINIA. See LYSIMACHIA.

LUNARIA *rediviva.* Perennial Honesty. A high and bushy 80 cm. Crucifer growing in shady woods on the mountains of Northern and Central Europe on lime. Good for underwood and cool places. In April and May it bears lilac, sweet-scented flowers followed by large, flat seed capsules which are used for winter bouquets. Seed or division.

LUPINUS. Tall herbaceous or half shrubby Pea Flowers well known and much appreciated in gardens. Suitable for the border and some for the rockery. While in California I saw slopes of Lupines which were rarely beautiful, forming large pictures of azure blue, framed by the gold fields of the Californian Poppy. Jepson describes not less than 250 different species and varieties in California alone. They make a marvellous decoration all over the country, wafting their delicious smell to the traveller. It is said that these masses are an insurmountable barrier to the meadow fires and are blessed for that reason. Few can be admitted to the rock garden; and, from the perennial ones, only those that are modest. Several have silver-white foliage and most of them are lime-hating. Seed.

L. argenteus VII; 80 cm.; blue and white; N. Am.; 1. P.
L. Breweri VII; 15 cm.; violet; R. M.; 1. P.
L. cæspitosus VII; 12 cm.; pale blue; R. M.; 1.
L. Chamissonis VII; 90 cm.; lilac violet; Cal.; 1. P.
L. decumbens; VIII; 15 cm.; lavender blue; N. Am.; 1. P.
L. Kingii VII; 15 cm.; pale blue; R. M.; 1.
L. leucophyllus VII; 30 cm.; bluish white; Cal.; 1. P.
L. Lyalli VII; 10 cm.; sky blue; R. M.; 1, 4.
L. polyphyllus VI-IX; 1 m.; violet; R. M.; 1. P. (Numerous vars. blue, white, pink, etc.)
L. saxosus VII; 30 cm.; blue and gold; R. M.; 1, 4.
L. superbus VII; 20 cm.; blue; Cal.; 1. P.

LUZULA. Woodrush. Woodland plants of the Rush family, some of them being attractive and good for shady parts of the garden. Seed or division. *L. albida* and *L. nivea* from European woods have corymbs of white flowers, almost everlasting; *L. lutea,* from the Alps and Pyrenees, has yellowish flowers; *L. sylvatica* is dark brown.

LUZURIAGA *erecta* (*Caliixene polyphylla*). A very rare creeping Asparagus from the S. Andes extending thence to the Magellan Straits on the old Fern trunks. Does not exceed 2-5 cm. in height here with us. 9.*. P.

LYCHNIS. Campion. An extremely beautiful genus of perennials which merits extensive cultivation for the brilliancy of the flowers, some being most effective border plants (*L. coronaria, fulgens,* *chalcedonica, Viscaria plena*). All are ornamental. Seed or division.

L. alpina IV; 8 cm.; bright pink or white; Al., B. R., N. Am.; 1, 4.

L. Bungeana VII; 30 cm.; bright red; Ch.; 1.

L. chalcedonica. Maltese Cross. VI-IX; scarlet; Or.; 1.

L. (*Agrostemma*) *coronaria* VI-IX; 60 cm.; bright magenta; S. Eur.; 1.

L. (*Melandrium*) *diurna* IV; 30 cm.; carmine; Eur.; 1. (A good var., *fl. pl.*)

L. flos cuculi IV-X; 30 cm.; carmine rose; Eur.; 1, 3. (A var. and *fl. pl.*)

L. flos Jovis V-VII; bright rose; Al., Cp.; 1. (A var. *alba.*)

L. fulgens VI-IX; 20 cm.; bright vermillion; Si.; 1.

L. grandiflora VII; 30 cm.; bright crimson; Ch.; 1.

L. Haageana VII; 25 cm.; flesh rose; garden vars.; 1.

L. laciniata VII; 80 cm.; scarlet; Ch.; 1, 3.

L. (*Petrocoptis*) *Lagascæ* IV-VII; 8 cm.; bright carmine; Py.; 4, 6.

L. lapponica; an arctic *alpina* with ampler dimensions.

L. miqueliana VII; 25 cm.; bright red; Jap.; 1.

L. (*polyschemone*) *nivalis* IV; 15 cm.; carmine; Tr.; 4, 10.

L. (*Petrocoptis*) *pyrenaica* VI; 10 cm.; white; Py.; 1, 4.

L. Senno VII; 30 cm.; dark red; Jap.; 1, 6.

L. Sieboldi VII; 20 cm.; light rose; Si.; 1.

L. viscaria VI; 30 cm.; bright carmine; Eur.; 1. (Vars. *alba, alba plena, fl. pl.* and *splendens.*)

L. Yunnanensis V; 20 cm.; white; Y.; 1, 6.

LYSICHITUM *Kamtschatense.* West Skunk Cabbage. For the benefit of those of my American friends who make light of my liking for this beautiful Arum I offer words of admiration by the master, Farrer: "This sumptuous Aroid is well worthy of its sumptuous name. It is a plant of very big and very rich bog, where in the early years, it throws up stemless great yellow callas after the fashion of Symplocarpus, to be followed by the unfolding of vast glaucous-green tropical foliage like that of some Banana. So it is always said to be, so it always proved, and so it may be seen in the wild marshes of Japan and all across the Rockies. Yet, when I first saw it, in a stinking deep slough of the Hokkaido, in the last chill clarity of the sundown, one early April of that frozen far Island, the huge cups were not only as large as those of *Calla æthiopica,* but also as white; and their beauty and impressiveness, shining among the pools of still pale water at twilight, was far, far in excess of anything ever attained by the common yellow-blossomed form, magnificent though this may be, and identical in size and development." I may add that when, on the twenty-first of March, 1926, I saw from the train descending from Colorado to the Pacific, along the Columbia River, these deep yellow Arums I was crushed before its majesty, and had no rest till I could see it nearer. Now we have it here and grow it in a little pond, in shade; but it has not yet flowered. I hope! It wants deep spongy and moist soil. Seed (slow germ.).

LYSIMACHIA. Loosestrife. Herbaceous perennials with mostly yellow flowers. The Creeping Jenny is quite well known to all who know the streets of London, where it is grown as a hanging plant in the window. The group is now divided into

Stironema, Lysimachia, and *Lubinia,* but we consider them here under their old name. They generally like moist situation and light soil. Many are really bog plants. Division or seeds.

L. atropurpurea VII; 30 cm.; deep red; Or.; 1.
L. barystachys VII; 60 cm.; white: Ch.: 1, 3.
L. ciliata VII; 40 cm.; lemon yellow; Eur., N. Am.; 1, 3.
L. clethroides VI-IX; 1 m.; pinkish white; Jap.; 1, 3.
L. davurica VIII; 1 m.; yellow; Si.; 1, 3.
L. ephemerum VII; 1 m.; white; S. W. Eur.; 1, 3.
L. Henryi VII; 30 cm.; yellow; Ch.; 1, 3.
L. Lobelioides VII; 40 cm.; white; H.; 6.
L. longifolia VII; 50 cm.; lemon yellow; N. Am.; 1, 3.
L. mauritiana VIII; 30 cm.; pinkish white; Ch.; 1.*
L. nemorum VII; 5 cm.; yellow; Eur.; 1, 2.
L. Nummularia VI-IX; 5 cm.; bright yellow; Eur., N. Am.; 1, 3. (Vars. *fol. var.* and *fol. aureofoliata.*)
L. parridiformis VII; 40 cm.; bright yellow; Ch.; 1, 2.
L. punctata VII; 1 m.; bright yellow; Eur.; 1, 3.
L. quadrifolia VIII; 40 cm.; golden yellow; N. Am.; 1, 3.
L. thyrsiflora VII; 60 cm.; yellowish; Eur., Si.; 1, 3.
L. verticillata VII; 1 m.; bright yellow; Ca., Or.; 1, 3.
L. violacens VII; 1 m.; purple; Ch.; 1, 3.
L. vulgaris VII-X; 1 m.; yellow; Eur., As.; 1, 3.

LYTHRUM. The type of the Lythrariaceæ is a common bog plant, seldom seen in gardens; flowers bright carmine, disposed on erect brilliant spikes. All are bog plants. Division and seed. *L. Salicaria,* growing all through Europe in the marshes, is the glory of late summer. Its brilliant spikes are very attractive and come just at a time when we have few pink flowers in the garden (VII-X). In the United States it is replaced by *L. alatum* with verticillate foliate and spikes of carmine flowers. *L. virgatum* is an Oriental pink-flowered plant 80 cm. high; *L. Græffery* and *L. hyssopifolium* are two lower-growing kinds of Southern Europe with rose flowers. All like a moist position and sun. Some garden varieties.

MAIANTHEMUM (CONVALLARIA or SMILACINA) *bifolium.* Shade-Flower. A nice Lily-of-the-Valley creeping in the mountainous woods of Europe and North America, growing always under wood. It is stoloniferous and rapidly invades a corner of leaf mould. *M. canadense,* from North America, is the same plant multiplied in all its parts. Culture easy in a shady corner. Division or seed (slow germ.).

MALVA *moschata.* Musk Mallow. A nice plant for the rock garden especially in mountain settings; big light rose flowers, pure white in the var. *alba,* flowering from May to October. *Malva alcea* is near to it; light sandy loam and sun. Seed.

MALVASTRUM *coccineum* is one of the brightest flowers I ever got from Northwest America. The plant is low and creeping, with greyish foliage and gives in May and June brilliant crimson flowers, very attractive and elegant. It never seeds with us and we have great trouble in finding cuttings on it. I believe I saw it from the express train running through the Mohave Desert and was awfully vexed not to be able to stop somewhere in the neighbourhood in order to pluck it. Numerous

Malvastrums are given in the *Flora of California* under the name *Sphæralcea.*

MAMMILLARIA. See Hardy Cacti.

MANDRAGORA. A famous Solanacead of awful mythological reputation[21] of which there are two forms, *M. autumnale* with purple flowers and *M. vernalis* with greenish non-showy flowers, both referred to *M. officinalis.* Books have been published on legends about this plant, which has fleshy roots and large, oval, tobacco-like leaves. The big seed capsule smells like a russet apple. We have it here at the foot of a wall; sunny and dry. Seed.

MARGYRICARPUS *setosus.* A little shrub with finely divided leaves which in the S. Andes represents the genus Dryas; however, it has nothing in its appearance in common with its cousin. Low shrub, 40 cm., with insignificant flowers followed by waxy white berries; cult. 1. Seed or cuttings.

MARRUBIUM. Horehound. The white-greyish foliage of this South Europe Labiate is adapted to dry slopes, hot and sunny rockeries, and barren places in the wild garden. *M. candidissimum, libanoticum, sericeum,* and *velutinum,* from the Orient and Southern Europe, are the best for us. Cuttings, division, or seed.

MARSDENIA *erecta.* A little 40-50 cm. high shrub belonging to the Asclepiads, with numerous white flowers which we got forty years ago from the Orient. It is one of the good summer decorations of our rockery; sun and sheltered situation. Cuttings.

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[21] See *Bull. of the Smith. Inst.,* No. 2644, Washington, 1922.

MARSHALLIA *cæspitosa.* A dwarf Composite from North America with bluish globular flowers, trailing and carpeting; half sun. Division and seed.

MATTHIOLA. Stock. Well-known garden plants from the South; some are dwarf, cæspitose or stoloniferous, and adorn gently the walls and sunny sides of rockeries. Seed or sprouts.

M. fenestralis V-IX; 20 cm.; bright carmine; Crete; 6.*
M. odoratissima VI; 25 cm.; brownish yellow; Or.; 1, 4, 6.
M. pedemontana VI; 10 cm.; yellowish brownish purple; W. Al.; 4.
M. sinuata VI-IX; 30 cm.; violet purple; Med.; 1, 6.
M. thessala VI; 20 cm.; lilac; Or.; 4.
M. tristis VI-VII; 20 cm.; brown; S. Eur., At.; 4.
M. valesiaca VI; 10 cm.; lilac rose; C. Al.; 4.
M. varia VII; 20 cm.; lilac; S. Eur.; 4.

MATTIA (Rindera). These are Oriental Borages for dry and sheltered places; they flower late in the summer. Seed.

M. cæspitosa VII; 10 cm.; pink and blue; Or.; 4, 6.
M. græca VII; 15 cm.; rich purple; Gr.; 1, 4.
M. Schlumbergi VIII; 25 cm.; brilliant violet; Lib.; 1, 6.
M. umbellata VI; 15 cm.; brown crimson; E. Eur.; 1, 4.

MAZUS. Very dwarf and creeping plants near to Mimulus, carpeting the soil in large areas when they find a spongy, rather moist, and light soil. *M. pumilio,* from New Zealand, 2-5 cm. high, is adorned by bright lilac and white flowers (V-X), not exceeding 5 cm. high; *M. rugosus,* its Asiatic sister, has big blue flowers with a golden spot. Division or seed.

MECONOPSIS. These plants are becoming every day more popular. In my young days we knew *M. cambrica* and a nebulous one called *petiolata* which is *Stylophorum diffusum.* The last edition of Paxton's *Garden Dictionary* (1898) includes only four Meconopsis, two of them being Californian and not real "Asiatic Poppies." Thanks to the explorations of Forrest, Kingdon-Ward, Wilson, Farrer, etc., we now get some new Meconopsis every year.[22] Fedde, in 1909, described 28 different Meconopsis and Farrer in the *Gard. Chron.* gives us many more. In English gardens the plants play a great rôle and have much importance. In our dry and Continental climates they succeed only in shady places and in peat. We have good success with them in moist and cool parts of a mountain side on the Jura (Marchairuz at 1450 m. alt.). In maritime countries and in foggy lands they do better than in our dry climate. Many are biennial, and all, excepting the W. Eur. *cambrica* and two others belonging to the American Pacific Coast, are Asiatic. Mr. Kingdon-Ward, in June, 1926, said: "Nearly 50 species are known and ninety-five per cent of them come from the Himalayas and Western China." They are the famous "blue Poppies" that travellers write of, and which Colonel Younghusband found in masses when on the march with his army to Lhassa. They are alpine or subalpine; some of them reach an altitude of 5000 m. in the Himalayas, which explains the fact that they generally do better in high mountain gardens than in our lowlands. They like above all a damp climate and dread the Continental dry air. Seed.

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[22] See *Monogr. of Papaveraceæ,* Eng. *Pflanz.,* Vol. 40, p. 247.

The cultivation of these treasures in a dry climate is a peaty leaf mould in shady and moist, well-drained places. It is to be remembered that they must have plenty of depth for the taproot. Mr. K.-Ward has collected specimens of *M. aculeata* with roots three times as long as the portion above ground (this is generally the case with saxatile plants). Cultivators in England, says Mr. Ward, who have not seen these plants growing wild would be astonished at the conditions under which they often grow and thrive in Nature; "the stark barren screes, just so much unlimited hungry gravel and shingle, without apparently a shred of humus in it; water-leads days and night for weeks, and when the sun does come out the incandescent heat, light, and power they have to face! All this they withstand unblenchingly and flourish."[23]

M. aculeata VI; 50 cm.; lilac and gold; H.; 2, 5, 9.
M. Baylei VI; 60 cm.; blue; Ch.; 2, 5, 9.
M. bella VI; 20 cm.; blue; H.; 5, 9.
M. betonicifolia VII; 1 m.; violet blue; Y.; 5, 9.
M. brevistyla VI; 25 cm.; bright yellow; Ch.; 5, 9.
M. cambrica, Welsh-Poppy, V-XI; 40 cm.; yellow; W. Eur.; 1, 2. (Vars. *aurantiaca* and *fl. pl.*)
M. cawdoriana VII; 200 cm.; sky blue and fragrant; H.; 5, 9.

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[23] Mr. Kingdon-Ward, *Gard. Chron.,* 1926, IV-VI.

M. chelidonifolia VII; 60 cm.; yellow; Ch.; 5, 9.
M. concina VI; 20 cm.; violet blue; Y.; 5, 9.
M. crassifolia VI; 25 cm.; gold yellow; Cal.; 2, 5.
M. decora VI; 40 cm.; white; H.; 5, 9.
M. Delavayi VI; 20 cm.; violet; Ch.; 5, 9.
M. discigera VII; 30 cm.; blue and crimson; H.; 5, 9.
M. elata (*nepalensis*) VII; 1 m.; yellow; H.; 2, 5.
M. eximia VI; 15 cm.; lilac; Ch.; 5, 9.
M. Forresti VI; 30 cm.; sky blue; Ch.; 5, 9.
M. grandis VI; 1 m.; violet blue; Ch.; 5, 9.
M. Henrici VII; 15 cm.; intense violet; Ch.; 5, 9.
M. horridula VI; 15 cm.; dark blue; Ch.; 5, 9.
M. integrifolia V-VIII; 40 cm.; sulphur yellow; Ch.; 2, 5, 9.
M. lancifolia VI; 15 cm.; violet; Ch.; 5, 9.
M. latifolia (*sinuata*) VI; deep metallic blue; Ch.; 5, 9.
M. lepida VI; 15 cm.; lilac; Ch.; 5, 9.
M. napaulensis VII; 1.50 m.; brownish purple; H.; 5, 9.
M. nepalensis. See *elata.*
M. oliveriana VII; 1 m.; purple; Ch.; 5, 9.
M. paniculata VII; 1 m.; yellow; H.; 5, 6.
M. petiolata. See *Stylophorum diphyllum.*
M. Prainiana VII; 1 m.; deep blue; H.; 5, 9.
M. Prattii VII; 40 cm.; azure blue; Ch.; 5, 9.
M. primulina VI; 20 cm.; dark purple violet; H.; 5, 9, 10.
M. pseudo-integrifolia VII; 20 cm.; yellow; H.; 5, 9.
M. psilonoma VI; 15 cm.; blue; Ch.; 5, 9.
M. punicea VI; 20 cm.; bright scarlet; Ch.; 5, 10.
M. quintuplinervis VII; 25 cm.; purple lilac; Tibet; 5, 9.
M. racemosa VI; 50 cm.; deep blue; H.; 5, 9.
M. robusta VI; 40 cm.; yellow; H.; 5, 9.
M. rudis VI; 50 cm.; light blue; Ch.; 5, 9.
M. simplicifolia VI; 30 cm.; lilac and yellow; H.; 5, 9.
M. sinuata. See *latifolia.*
M. superba VII; 1.50 m.; white; H.; 5, 9.
M. torquata VI; 30 cm.; crimson; Ch.; 5, 9, 10.
M. Wallichiana VII; 1 m.; light lilac; H.; 5, 9.

MEDEOLA *virginica.* A North American liliaceous plant whose roots smell of cucumber, and with an asparagus-like appearance; 1, 6.

MEGASEA. See SAXIFRAGA.

MELANDRIUM. See LYCHNIS and SILENE.

MELICA. Graceful foliage with green or brown spikes of seeds, very ornamental in a rock garden; half shade or sun. Seed and division.

MELITTIS *Melissophyllum.* Balm. Belonging to the Sage family, this Eastern Europe beauty forms dense tufts of square 30 cm. high stems bearing pairs of leaves and then, near the top, flowered whorls of very large blossoms of the most vivid white and pink, with ample lip and showy helmet. In some parts of the Maritime Alps the flowers are deep purple. (V̄) ; culture 1, 2. Seed.

MENTHA (MENTHELLA) *Requienii* (*Thymus corsicus*). Very fragrant microscopic Mint of Corsica, carpeting the soil with its numerous creeping stems, adorned by small, round, bright green shining leaves; the violet flowers are very small. It likes a cool, damp, level, and sheltered place. Other Mints can be admitted to the rock garden: *M. citrata* (Chartreuse or Red Mint), with a delicious flavour and red stems; *crispa,* with crested foliage; *Cunninghamii,* from N. Z., quite dwarf; *gibraltarica,* dwarf and creeping,*; *piperita* and its German var. *saxoniensis* (the finest for aromatic purposes) ; *viridis fol. var.,* etc.[24]

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[24] All are more or less medical and aromatic (see *Plantes et Santé,* pp. 163-165).

MENYANTHES *trifoliata*. Bogbean. The fine and delicate Gentianad growing in bogs and quiet waters all over the Northern Hemisphere; leaves ternate (hence its popular name, Water Trefoil); the flower is finely divided, hence the name "Filigree Flower," pink and white. In the far Northwest America grows *M. crista-galli*, a smaller plant with larger leaves and pure white flowers as close as in Aponogeton. Both like calm and shallow water or very moist bogs. Division or seed (slow germ.).

MENZIESIA. Heaths with fasciculate flowers, nodding, very elegant, precious for the rock garden. They are strictly silicicole and want peat. Cuttings, division, or seed.

M. Breweri V; 25 cm.; pink; Cal.; 5.
M. cærulea (*Phyllodoce*) VI; 25 cm.; bluish; B. R.; 5.
M. empetriformis VI; 15 cm.; bright pink; N. Am.; 5.
M. ferruginea VI; 20 cm.; brown; N. Am.; 5.
M. polyfolia. See *Dabœcia.*

MERENDERA. These are of the Colchicum family, children of the Mediterranean regions where they represent the autumn Crocus in form and colour; they like sun and fresh, deep soil. Seeds (slow germ.) or suckers.

M. Bulbocodium VII-IX; 8 cm.; rose lilac; Py., Sp.; 1, 7.
M. Caucasica III; 10 cm.; flesh rose; Ca., Or.; 1, 7.
M. filifolia III; 10 cm.; bright lilac; S. Eur., At.; 1, 7.
M. sobolifera III; 8 cm.; lilac; Or.; 1, 7.

MERTENSIA. Lungwort. Borages of great value, flowering in the spring and giving beautiful rose to blue flowers; deep loam. Seed or division. There are albino forms of many of them.

M. alpina V; 20 cm.; azure blue; N. Am.; 1, 6.
M. Backeri V; 15 cm.; blue; R. M.; 1, 6.
M. coriacea V; 20 cm.; blue; R. M.; 1, 6.
M. davurica VI; 25 cm.; sky azure; Si.; 6.
M. Drummondii V; 15 cm.; azure blue; A. R.; 6, 10.
M. echioides V; 10 cm.; deep blue; H.; 1, 5, 6. P.
M. elongata IV; 20 cm.; china blue; H.; 5, 6.
M. lanceolata IV; 40 cm.; pinky blue; N. Am.; 1, 6.
M. maritima, Oyster-Plant, IV; 20 cm.; blue; B. R.; 6, 9.
M. oblongifolia V; 40 cm.; sky blue; R. M.; 1, 6.
M. paniculata VI; 30 cm.; sky blue; R. M.; 1.
M. pratensis V; 30 cm.; pinky blue; New Mexico; 1, 6.
M. primuloides V; 15 cm.; deep blue; H.; 6. P.
M. sibirica (*ciliata*) VI; 50 cm.; pinky blue; Si.; 1.
M. tibetica VI; 20 cm.; azure blue; H.; 6, 10.
M. virginica (*pulmonarioides*) IV; 40 cm.; sky blue; N. Am.; 1.

MEUM *athamanticum* and *Mutellinum.* Aromatic Umbellifers of low habit. The first is a lime-hating mountain species with the finest foliage imaginable; it constitutes large meadows on sunny granitic alps and has white flowers in umbels (VI-VII); peat and sun. Division or seed (slow germ.).

MICROMERIA. Small Labiates, dwarf and aromatic, standing near the Thymes. Some, like *Douglasi* of Northwest America, are creeping and carpeting. This one has the strongest smell and there is an island near San Francisco, called "Yerba Buena," which is the popular name of *M. Douglasi,* covered with it; if you walk there you smell the deep fragrance of the plant. All the Micromerias want a light soil, a sheltered and sunny situation. Division, cuttings, and seed.

M. cremophyla VII; 8 cm.; purple; Gr.; 4.
M. cristata VII; 10 cm.; purple pink; Or.; 4.
M. croatica VIII; 30 cm.; lilac; E. Eur.; 4.
M. Douglasi; small unshowy fl.; N. W. Am.; 1.* (Creeping.)
M. filiformis VII; 15 cm.; pale rose; S. Eur.; 1, 4.
M. piperella VII; 15 cm.; bright pink; S. Eur.; 4.
M. rupestris VIII; 25 cm.; white; S. Eur.; 1, 5.

MIMULUS. Musk, Monkey-Flower. These are scrophulariaceous and have generally bright colours, flowering all the summer long. Some, like *M. luteus,* have escaped from gardens and are naturalised all about some of our lakes (the Lac de Neuchâtel is framed in many places with its yellow flowers). In the Cascade Mountains of Oregon I saw carpets of *M. alsinoides* hanging from the wet rocks and making a splendid contrast to the sky-blue carpets of *Nemophila insignis.* I remember, as also do many other people, that *M. moschatus* formerly diffused a very strong smell of musk, a character that it has now lost. All Mimulus like light and porous moist soil, a cool situation, and light. Division or seed.

M. alpinus VII; 10 cm.; bright yellow; N. Am.; 1, 3.
M. Bartonianus VII; 20 cm.; rose; garden var.; 1, 3.
M. bicolor VIII; 25 cm.; yellow and white; Cal.; 1, 3.
M. Bigelowii VII; 10 cm.; crimson and yellow; R. M.; 1, 3.
M. Burnetti VII-X; 25 cm.; brownish red; N. Am.; 1, 3.
M. cæspitosus VII; 10 cm.; bright yellow; R. M.; 1, 3.

M. cardinalis VI-X; 50 cm.; scarlet; R. M.; 1, 3. (Some garden vars.)
M. cupreus VII; 25 cm.; copper red; N. Am.; 1, 3.
M. dentatus VIII; 40 cm.; yellow and brown; Cal.; 1, 3.
M. Geyeri VII; 20 cm.; yellow; N. Am.; 1, 3.
M. glutinosus. See *Diplacus.*
M. implexus VII, 25 cm.; pale yellow; R. M.; 1, 3.
M. Langsdorfii VII; 50 cm.; yellow; R. M.; 1, 3.
M. Lewisii VII; 30 cm.; bright rose; R. M.; 1, 3, 9.
M. luteus V-X; 30 cm.; bright yellow; N. Am.; 1, 3.
M. moschatus, The Musk, VII; 10 cm.; yellow; N. Am.; 1, 3.
M. nanus VII; 2 cm.; rose purple; Cal.; 3, 9, 10.
M. primuloides VI-X; 5 cm.; pale yellow; R. M.; 3, 5, 9.
M. (*Mazus*) *radicans* VI; 3-4 cm.; white and yellow; N. Z.; 9, 10.
M. (*Mazus*) *repens* VI; 5 cm.; white, lilac, and yellow; N. Z.; 9, 10.
M. ringens VII; 30 cm.; violet; E. Am.; 1, 3.
M. scouleri VII; 50 cm.; yellow; R. M.; 1, 3.
M. Tilingii VIII; 60 cm.; yellow; Cal.; 1, 3.

MINUARTIA. See ARENARIA.

MIRABILIS. Four o'Clock. *M. Jalapa,* long cultivated, is wrongly considered as an annual. In California there are four perennial Mirabilis, not very brilliant but interesting. *M. californica* (*lævis*) is a bushy plant, 30 cm. high, with rose or reddish flowers; *M. multiflora* has bluish leaves and pink flowers; both like a sunny, sheltered position, deep, light soil. Root cuttings or seed.

MITCHELLA *repens.* Partridge Berry. A dwarf creeping Rubiad which covers the ground in the dense woods of Northeast America, where it constitutes a real carpet of dark green glossy evergreen leaves with little white flowers (IV-VI); all the winter through, and into the following summer you will find on them large scarlet berries which are really a beauty on the green floor. Travelling through the Blue Hills in the early spring, I was filled with admiration for the beautiful picture of the marvellous big and heteromorphic Lycopodium, young fronds of Onoclea and Adiantum, and the carpet of Mitchella covering the ground. In Japan, the *M. undulata* is found in the same conditions but has big boat-shaped bracts, cut into a few wide, deep, and sharp bays from which issue the long white tubes of the twin flowers. Peat, shade, and moist soil. Division or seed.

MITELLA. Bishop's Cap. A North American saxifrageous plant near to Heuchera, haunting the woodlands. The flowers are modest and greenish white, disposed in long and narrow spikes. They are of an extreme delicate loveliness and may be compared to a whirling little five-pointed Catherine-Wheel, says Farrer. *M. Breweri, caulescens, diphylla, nuda, ovalis, Parryi, pentendra* (*Drummondia mitteloides*), and *trifida* are grown in gardens. These are light green herbs with slender and graceful stems and white or greenish flowers. Shade, light soil. Seed or division.

MODIOLA *geranioides.* A Chilian Malvacead, 25 cm. high; slender stems bearing large carmine flowers (VI-IX); some of the long rampant stems produce big tubers which sink down in the soil and reproduce the plant. Rich, light soil; sun. Seed or tubers.

MŒHRINGIA. Small creeping cariophillaceous plants with pure white 4-5 petaled flowers and a very thin foliage. They like cool walls or cool corners in the rockery, and flower often all the summer through. *M. dasiphylla* (*sedoides*) from the Maritime Alps is a very dwarf, very frail little gem, not exceeding 2-3 cm. high, with small white flowers; it grows in the thinnest crevices of the lime wall. *M. diversifolia,* of the Eastern Alps, 10 cm. high; *M. glaucovirens* is a minuscule bluish tiny tuft that haunts the precipices of the Tombea and which can be grown on a tufa wall protected against the rain; *M. Grisebachii* and *Jankæ,* from the Balkans, want the wall; the common *M. muscosa,* which is the best of all, with bright green, very thin foliage, wants lime—it is marvellous on a shady or half-shady wall and flowers from IV-X; the rare *M. papulosa,* from the Tenda Alps, with bluish foliage; the *M. pendula,* from Tr. Ba., with 40-50 cm. long graceful and slender stem, covered with thin leaves and white flowers; the *M. polygonoides,* of the limestone *pierriers,* and the *M. Ponæ* (*bavarica*), of the Lago di Garda, are all worthy of culture in the rock garden or in the wall. Cuttings, division, or seed.

MOLOSPERMUM *cicutarium* (*M. Peloponesiacum*). A big-leaved decorative Umbellifer, with strong aromatic stem, that adorns the precipitous cliffs of the Pyrenees, the meridional, and the Oriental Alps. It has long taproots and is not easy to transplant; cool position and deep, fresh soil. Seed (slow germ.).

MOLTKIA. See LITHOSPERMUM.

MOLUCELLA (Ballota) *spinosa.* A small, half-climbing shrub of the Southern Alps, spiny, with white unshowy flowers. A sheltered spot and sunny position. Seed, cuttings, or division.

MONANTHES. See SEDUM.

MONARDA. Bee Balm, Oswego Tea, Wild Bergamot. An exceedingly sweet genus, with aromatic leaves; we had some in my grandfather's garden in 1860 and my mother always used to have some branches or leaves of Monarda on her table. They are rather coarse for the rockery but I cannot omit some of them. First of all the brilliant scarlet *M. didyma* with its *Cambridge scarlet* variety and the white flowering *M. d. alba.* Then comes *M. purpurea* which is exceedingly sweet-scented and has purple flowers; then another which appeared once here which has tender flesh-rose flowers; we named it *Florariensis.* Several others could be recommended. Observe, however, that the clumps do not stand long, and have to be divided every two or three years. Seed, cuttings, or division.

MORINA. Nobody would believe, at first sight, that this is a dipsaceous (scabious plant); but so it is. This genus belongs to the East, extending from the Balkans to the Himalayas. The leaves, often spinescent, are very aromatic if broken and have a strong lemon odour. The type is *M. longifolia* with 80 cm. high stems bearing long spikes of Acanthus-like flowers, light rose (VI-IX); *M. betonicifolia* with red flowers is still grown; *M. Coulteriana,* pale yellow; *Delavayi,* rose; *Kokamirica,* rose; *persica,* light pink, and *Wallichii,* pink. Having taproots they want a deep, well-drained soil; full sun. Seed.

MORISIA *hypogæa.* This is an exceedingly interesting Crucifer from Sardinia and Corsica. It is hardly 5 cm. high (will attain big dimensions if grown in rich soil, but then it loses its particular beauty); its foliage is Dandelion-like and the bright yellow flowers are short-stemmed. After flowering, these reveal the curious idiosyncrasy of the plant (Hypogæa). They turn earthward and bury their capsule under ground to incubate in the soil. Here we grew it formerly as a weed and we were first to introduce, or rather reintroduce, it into England[25] through Miss Willmott's garden in 1887. But for some years it seems to have sulked at Floraire. The same thing at the botanic garden at Torino where the plant, 50 years ago, was considered a weed; but many years ago it disappeared and I could not find one single vestige of it on my last visit there. The fact is that it is a capricious thing. It wants a poor soil in a sunny place. *Cossonia africana* replaces it, having the same aspect, but is bigger in all its parts.

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[25] It was first introduced in 1834 by Mrs. Palliser from seed brought by Prof. Moriss, but is lost since 1840.

MUEHLENBECKIA. Wirewine. *M. adpressa, axillaris, complexa,* and *nana* are dwarf creeping or climbing evergreen shrubs belonging to the Polygonaceæ, with small white-pinkish flowers, deep brown stems, and dark green leaves. They come from Australia and New Zealand, and want good, light soil and sun.

MULGEDIUM (LACTUCA). Tall, robust herbs, belonging to the Lettuces, with purple-blue flowers; they have big foliage and great stature and must be planted in damp, shady places in the wild garden or in big rockeries. Leaf mould. Seed.

M. alpinum VII; 1 m.; soft pearly blue; Eur., N. Am.; 1, 2.
M. Bourgæi VII-X; 1.50 m.; purple blue; Ca.; 1, 2.
M. Plumieri VII; lilac bluish; S. Eur.; 1; L.
M. macrophyllum (*grande*) *multiflorum* and *tataricum* (Asiatic) are invading pests, not to be recommended for garden use.

MUSCARI. Grape Hyacinth. Small Liliads growing in the vineyards or on dry fields and slopes in Southern Europe. All want a sunny and dry place (1, 7, or 8) and are reproduced from seed (slow germ.). *M. atlanticum, botrioides, Bourgæi, comosum, Heldreichii, latifolium, pendulum, pulchellum,* and *racemosum* are blue; and *M. moschatum,* an Oriental, delicious-smelling one, is yellow and brown.

MYOSOTIDIUM *nobile.* A very big Forget-me-Not from Chatham Island in New Zealand; it looks like a very large and glossy-leaved Megasea in bright green foliage with thick 60-80 cm. high stalks, bearing from May to July loose bunches of blossoms like those of a gigantic Myosotis flower, azure blue with white. It was introduced in 1856 and exhibited for the first time at South Kensington, London, Eng., in 1886 by Mr. Ed. Loder. The culture of this treasure is impossible in Continental climates and it must be left to our friends in South and Central England and in Ireland.

MYOSOTIS. Forget-me-Not. Well known in gardens and in literature. Those of the Northern Hemisphere are blue with white and pink varieties, and in Australia they are white or yellow. Many are annuals and cannot be included here, but the alpine species are either biennial or perennial. Seed.

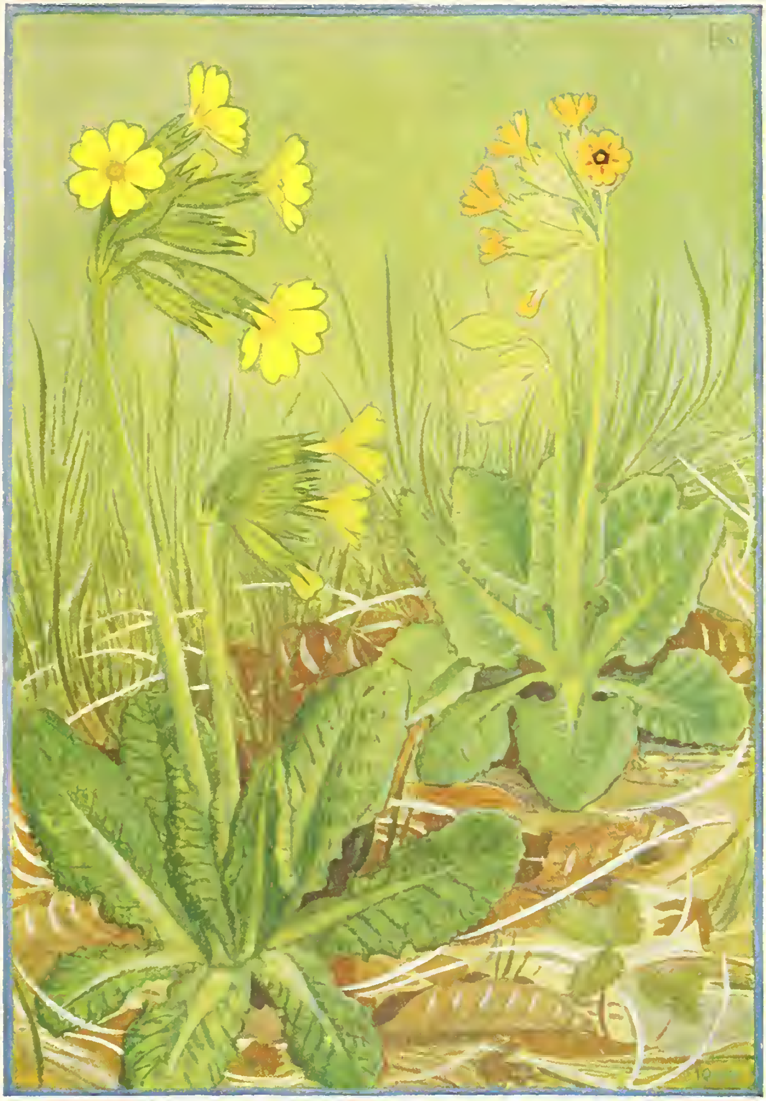
M. alpestris III-VI; 15 cm.; azure blue; Eur., N. Am.; 1. (Numerous garden vars.)
M. australis VI; 10 cm.; yellowish; Aus.; 1.*
M. azorica VI; 10 cm.; bluish purple; Azores; 1, 6.
M. cæspitosa VI; 5 cm.; azure blue; Sept. Reg.; 6.
M. capitata VII; 15 cm.; gold yellow; N. Z., Auckland; 6, 10.
M. concina VII; 30 cm.; bright yellow; N. Z.; 6, 10.
M. dissitiflora IV; 20 cm.; azure blue; Eur.; 1, 6.
M. Forsteri VI; 20 cm.; yellow; N. Z.; 6, 10.
M. Hookeri IV; 5 cm.; azure blue; Tibet; 10.
M. lithospermifolia V; 15 cm.; azure; Eur.; 6.
M. palustris V; 25 cm.; azure with gold eye; Eur.; 1', 3. (Vars. *p. semperflorens,* flowering IV-XI, and *grandiflora.*)
M. pyrenaica; a dwarf *alpina.*
M. Rehsteineri V-IX; 5 cm.; blue; Switzerland; 1, 3.
M. rupicola V; 5 cm.; azure blue; Scotland; 1, 6.
M. Welwitschii VI; 15 cm.; light blue; Sp., Portugal; 1, 6.

MYRRHIS *odorata.* Sweet Cicely. A large Umbellifer with strong aromatic roots, bright green, delicately divided foliage, and white Carrot-like flowers. Deep rich soil, shade. Good for moist corners. Seed (slow germ.).

NARCISSUS. Daffodil. These are generally grown as meadow plants (No. 7) and only a few can be admitted to the rockery, the plant losing its leaves early in the year. The southern species and those beauties we get from Spain, N. Africa, and the Pyrenees can be nursed in sheltered, well-drained spots of a rockery, but the best place for them always is the bulb bed. In a Swiss meadow you may plant some between thin grass. Seed (slow germ.).

N. Bulbocodium III-IV; 20 cm.; yellow; S. W. Eur.; 1, 7.
N. Capax IV; 20 cm.; white; Ile Glénans; 7.
N. cernuus IV; 10 cm.; cream white; Py. (rare); 6, 7.
N. cyclyamineus V; 10 cm.; cream white; Sp.; 6, 7.
N. Jonquilla IV; 25 cm.; bright yellow; S. Eur.; 1, 7.
N. juncifolius V; 10 cm.; bright yellow; Py., Sp.; 1, 7.
N. moschatus IV; 30 cm.; white and yellow; Py.; 1, 6, 7.
N. poeticus V; 40 cm.; white; strong perfume; Central, S. Eur.; 1, 7. (Numerous garden vars. and hybrids.)
N. pseudo-narcissus III; 25 cm.; yellow; Eur.; 1, 7. (Numerous garden vars. and hybrids.)
N. radiiflorus IV; 30 cm.; white; strong perfume; S. Eur.; 1, 7.
N. Tazetta IV; 50 cm.; yellow and white; S. Eur.; 1, 3, 7.
N. triandrus IV; 25 cm.; pure white; Sp.; 6.

NARDOSMIA (Petasites or Tussilago) *fragrans*. Sweet Butterbur. A sweet, pale lilac flower which rejoices our heart in the wintertime; those dense heads of bloom on 25 cm. stems appear, January to April, in a sheltered suitable corner. The leaves



Primula elatior Primula officinalis

are those of Petasites, and evergreen. Comes from the Mediterranean regions and is very invading and wants a shady place. You may see it along the railway slopes in the south of England, invading and adorning otherwise barren places.

NARTHECIUM *Ossifragrum*. An unshowy Asparagus of the West Europe bogs, with yellowish flowers. Can be planted in the bog.

NEPETA. Aromatic Labiates growing on very sunny slopes in South Europe and the Orient. All the species like a sunny and dry situation. Propagated from seed or by division.

N. cyanea VII; 50 cm.; blue; Ca.; 1.
N. grandiflora VII; 1 m.; violet blue; Ca.; 1.
N. macrantha VIII; 80 cm.; lilac blue; Si., Tu.; 1.
N. Mussini VII; 50 cm.; blue; Ca., Or.; 1; grey foliage.
N. nuda VII; 50 cm.; pale violet; Eur., As.; 1.

NERTERA *depressa*. A dwarf rubiaceous plant from New Zealand, hardly hardy with us but standing the winter in Northern Europe where the snow covers the soil in winter. It is a minute plant with bright green foliage, not exceeding 5 cm. The flowers have no worth, but all the summer through develop masses of bright scarlet berries which are really beautiful. Naturalised here and there in Europe, in damp meadows in the neighbourhood of Glasgow and in South Sweden about Göteborg. It wants a sheltered position and wet ground. Seed or division.

NIEREMBERGIA *rivularis*. Cup-Flower. Dwarf creeper belonging to the Potato family, coming from South America where its densely packed masses of small leaves form sheets on damp, muddy banks and its "very large pearl-pale cups recall those of some exquisite Convolvulus dropped from heaven" (Farrer). It rapidly carpets the ground, especially if moistened from below. We have it in flower all the summer through, but it never seeds. Division.*

NOLINA *Bigelovii, Loderi,* and *Parryi* are three Californian Yuccas which grow in the desert and have rigid linear leaves crowded into a rosette at the ground; the flowers are whitish and disposed in panicles. We plant them here in a sheltered corner on the rockery and cover them in winter. Seed.

ŒNOTHERA. Evening Primrose. As long ago as 1614 Europe got from the United States a yellow flowering plant (*O. biennis*) which invaded all our wet places. This is a biennial, but the delicate smell of its large pale yellow flowers counts in its favour. Others are perennial, and are excellent things for us; very suitable for the rockery. They all like sandy soil and sun and are grown from seed. *O. cæspitosa* never seeds with us, despite all efforts at artificial fecundation; but as it is very free growing and invading, it is easy to propagate from offsets.

O. acaulis VIII; 15 cm.; yellow; S. Am.; 1.

O. cæspitosa (*marginata*) VI-X; 20 cm.; light rose and smelling; R. M.; 1.

O. eximia VII; 15 cm.; white; N. Am.; 1.

O. Fraseri VI; 50 cm.; bright yellow; N. Am.; 1.
O. fruticosa VII; 60 cm.; bright yellow; N. Am.; 1. (Vars. *Eldorado* and *Youngii.*)
O. Howardii VII; 10 cm.; yellow; N. Am.; 1.
O. linearis VIII; 30 cm.; yellow; N. Am.; 1.
O. macrocarpa (*missouriensis*) V-XI; 20 cm.; yellow; N. Am.; 1.
O. ovata VI; 10 cm.; bright yellow; Cal.; 1.
O. pallida VII; 30 cm.; pale rose; R. M.; 1.
O. pumila VI; 10 cm.; yellow; N. Am.; 1.
O. rosea VI-X; 1'0 cm.; bright rose; N. Am.; 1.
O. serrulata VI-XI; 20 cm.; yellow; N. Am.; 1, 6.
O. speciosa VI-X; 50 cm.; pale rose; N. Am.; 1.
O. spiralis VIII; 20 cm.; yellow; Cal.; 1. (Some garden hybrids, *Arendsi, hybrida,* etc.)

OLEARIA. Evergreen Composite shrubs with small white flowers, native to Australia and New Zealand and not quite hardy with us.

OMPHALODES. Venus' Navelwort. These delicious flowers were accepted by the famous critic Alphonse Karr as being really blue—a large number of so-called blue flowers he considered as being "gardener's blue." Some of these, especially the common and well-liked *O. verna* (named Blue-eyed Mary for Queen Marie-Antoinette) are the purest blue imaginable. Others, like that precious treasure of the Parnassus, *O. Luciliæ,* with its lovely glaucous foliage and its pale flowers, in the most delicate pearly tones of very pale porcelain blue, are aristocratic treasures that not everybody may possess. *O. cappadocica, nitida,* and *rupestris* have delicate sky-blue flowers and are gems of the garden. All want half shade and a spongy, well-drained soil. There are albino vars. of several of the following. Seed, cuttings, or division.

O. cappadocica V; 30 cm.; dark azure; Or.; 1.
O. Ikumæ V; 10 cm.; light azure; Jap.; 1, 6.
O. Japonica V; 25 cm.; blue; Jap.; 1, 6.
O. Krameri VI; 20 cm.; bright blue; Jap.; 1.
O. Luciliæ V-X; 15 cm.; porcelain blue; Gr.; 4, 6, 10.
O. nitida (*lusitanica*) VI; 15 cm.; dark azure; Sp., Portugal; 1.
O. rupestris VII; 5 cm.; bright blue; Or.; 4, 6, 10.
O. Thomsoni VI; 15 cm.; azure blue; Tibet; 4, 6, 10.
O. verna IV; 15 cm.; bright azure; S. Eur.; 1, 2.

ONOBRYCHIS. True Sainfoin. Pea flowers in bright rose and pink spikes, giving the mountain meadows a delicate loveliness. The best food for bees. *O. arenaria, montana, petræa, sativa,* and *saxatilis* are all European or Oriental kinds, with more or less bright rose flowers; deep soil, full sun. Seed.

ONONIS. Rest-Harrow. The type of this shrubby or half shrubby pea-flowered plant is *O. spinosa* of our fields, with pink and rose flowers. All like full sun and deep, well-drained soil and are reproduced from seed.

O. aragonensis VII; 30 cm.; yellow; Sp.; 1.
O. cenisia VII; 5 cm.; bright pink and light rose; S. Eur.; 1, 4. (A marvel for the sunny rockery.)
O. fruticosa VI; 1 m.; pink and rose; S. Eur.; 1.
O. minutissima VII; 5 cm.; yellow; S. Eur.; 1, 4.
O. Natrix VII; 30 cm.; bright yellow; Eur.; 1; P.
O. rotundifolia VII; 30 cm.; bright and pale rose; S. Eur.; 1.
O. speciosa VII; 1 m.; bright yellow; Sp.; 1.*

ONOPORDON *acaule* (*pyrenaicum*) is a dwarf Thistle from the Pyrenees and Spain with large white and spiny heads of flowers. It is biennial, as are all its brothers.

Onosma. Golden Drops. Strong and grey-leaved Borageworts coming mostly from the low mountain regions of Southwestern and Eastern Europe and from the Orient and the Himalayas. They grow in steppes and on arid slopes, often on sandy hills, always exposed to full sun and in dry situations. Their scorpioid yellow flowers (rarely blue, white, or red) are the glory of our walls and rockeries in summer. They want full sun, good loamy soil, mixed with sand, on a well-drained position. Seed or cuttings.

O. albo-roseum VI; 20 cm.; white and rose; Or.; 1, 4, 6.
O. arenarium VI-VIII; 15 cm.; light yellow; E. Eur.; 4, 6.
O. armenum VI; 15 cm.; lemon yellow; Or.; 1, 4.
O. bicolor VII; 30 cm.; purplish; Or.; 1, 4.
O. Bodeanum VII; 20 cm.; violet; Persia; 4, 6.
O. Bourgæi VII; 25 cm.; cream white; Or.; 1.
O. (*Echium*) *bracteatum* VII; 30 cm.; yellow; H.; 1, 6.*
O. cæspitosum VI; 20 cm.; yellow; Gr.; 1, 4.
O. cassium VI; 30 cm.; yellow; Or.; 1.
O. cæruleum VII; 25 cm.; blue and white; Leb.; 1, 4.
O. confertum VII; 20 cm.; red; Y.; 6.
O. decipiens (*nanum*) VI; 10 cm.; white; Or.; 1, 4.
O. echioides VII; 25 cm.; yellowish; S. Eur.; Or.; 1, 4.
O. Emodi VII; 25 cm.; pale red; Nepal; 6.
O. flavum VII; 20 cm.; golden yellow; Or.; 1.
O. fruticosum VI; 30 cm.; light yellow; Crete; 1, 4.
O. Helveticum VI; 20 cm.; sulphur yellow; Switzerland; 1, 4.
O. Hookeri VI; 15 cm.; pale purple; H.; 1, 4, 6.
O. montanum VI; 10 cm.; light yellow; Or.; 1, 4.
O. mutabile VII; 15 cm.; pink and blue; Or.; 1, 4.
O. paniculatum VII; 30 cm.; red; Tibet; 4, 6.

O. polyphyllum VII; 30 cm.; yellow; Or.; 1, 4.
O. pyramidale VII; 50 cm.; bright scarlet; H.; 6.*
O. rostellatum VII; 15 cm.; white and blue; Or.; 4, 6.
O. rupestre VII; 20 cm.; cream white; Or.; 1, 4.
O. sericeum VII; 30 cm.; bright orange yellow; Ca.; 1, 4, 6.
O. stamineum VII; 20 cm.; bluish purple; Or.; 1, 4.
O. stellulatum VII; 40 cm.; yellowish; S. Eur.; 1, 4.
O. Tauricum (True Golden Drop) VI-IX; 30 cm.; bright yellow; Or.; 1.
O. (*Echium*) *Thompsoni* VIII; 35 cm.; reddish; H.; 1, 6.*
O. tinctorium VII; 20 cm.; lilac and yellow; Taurus; 1, 4, 6.
O. Vaudense VI; 20 cm.; yellowish white; Switzerland; 4, 6.
O. velutinum VII; 20 cm.; white; Or.; 4.
O. Visiani VII; 20 cm.; bright yellow; 1, 6.

OPHELIA. See SWERTIA.

OPHIOPOGON (Snake-Beard). A liliaceous plant with grass-like foliage, white flowers, and blue berries. Used in Italy for edging the borders and for making lawns, etc., in dry and hot climates where grass cannot grow. The Italians call it "Erba japonica." Division or seed (slow germ.).

OPUNTIA. See Hardy Cactus, Chap. xi.

ORCHIS. See Terrestrial Orchids, Chap. x.

ORIGANUM. Marjoram. Aromatic plants of the Sage family growing in the Mediterranean regions and in the Orient, whose strong fragrance is one of their chief attractions; some, however, have very brilliant flowers and especially brightly coloured bracts which enclose the flowers. The Sweet Marjoram (*O. Majorana*) has been grown in gardens from the time of the Romans and is common in kitchen gardens. All want a warm, sheltered, and sunny situation. Division, cuttings, or seed.

O. Dictamnus VIII-X; 20 cm.; bright carmine; Crete; 1, 4, 6. (Downy foliage.)
O. Libanoticum VIII-X; 30 cm.; rose; Leb.; 1, 4.
O. pulchrum VIII-X; 20 cm.; bright pink; Or.; 1, 4.
O. sipyleum (*hybridum*) VIII-X; 20 cm.; pink; Or.; 1, 4.
O. Tournefortii VII; 20 cm.; pink; Gr.; 1, 4.

ORNITHOGALUM. Star of Bethlehem. Bulbous, liliaceous plants with white or greenish flowers in spikes or umbels. They want a deep, light soil and are suitable for meadows or underwoods. Seed (slow germ.). *O. nutans,* green-greyish nodding flowers; *O. pyrenaicum,* green-yellow flowers on long spikes; *O. umbellatum,* with brilliant white stars opening only in the full sun; 1, 2, 7.

OROBUS. Bitter Vetch. Nice Pea flowers differing from Lathyrus in being not climbing; some of them are useful for underwoods and shady corners. *O. vernus* is the best plant for shade. Easy culture. Seed.

O. albus VI; 50 cm.; white; S. Eur., Or.; 1, 2.
O. armenus VI; 30 cm.; purple; Or.; 1, 2.
O. aurantius VI; 25 cm.; bright orange; Or.; 1.
O. canescens VI; 40 cm.; deep blue; Eur.; 1.
O. lathyrioides. See *Vicia unijuga.*
O. luteus VI; 40 cm.; yellow; Eur.; 1.
O. macrorhizus VII; 30 cm.; pink and violet; Eur.; 1.
O. niger VI; 60 cm.; purplish carmine; Eur.; 1, 2. P.
O. sessilifolius VI; 30 cm.; violet; Ba.; 1.
O. variegatus VI; 30 cm.; purple rose; Py.; 1.
O. vernus II-IV; 20 cm.; purple, blue, and pink; Eur., Si.; 1, 2. (Vars. *albus, fl. pl.* and *roseus.*)

OSTROWSKYA *magnifica.* A splendid Campanula from Bokhara, found in 1884 by A. de Regel and introduced in 1887. This is one of the biggest flowers we have in gardens. The plant is quite glabrous with glaucous foliage, 1-1½ m. high stems bearing large pale lilac bells 12-14 cm. diameter with veins darker and bluish lilac. Roots fleshy, not to be divided. Sandy loam, dry, sunny situation at the foot of a wall. We succeed wonderfully well with it since planting it at the foot of an Arbovitæ ledge, the roots of the Thuya taking up the moisture and keeping the Ostrowskya roots dry. After the seeds are harvested we keep it very dry indeed. Seeds come up easily.[26]

OTHONNOPSIS (Othonna) *cheirifolia.* A succulent big Composite from Africa, with large yellow Daisy flowers, and thick glaucous foliage flowering all the summer through. Sheltered and sunny position. Division, cuttings, or seed.

OURISIA. In our Continental climate, difficult to grow. These Scrophulariaceæ belong to the Southern Hemisphere, and want pure peat in a damp climate. *O. coccinea,* from Chili, with bright scarlet flowers on 20 cm. high stems, carpeting the ground with its bright green foliage; *O. macrophylla,* with ample dark foliage and white flowers, and its brother, *O. macrocarpa,* with bigger flowers, both from New Zealand. In English gardens I saw *cæspitosa, cockayana, magellanica,* and *sessi-*

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[26] See figure in *Gard. Chron.,* 21, VII, 1888, p. 65; *Bot. Mag.,* 1888, Garden def., ch. 72-74, p. 681, etc.

lifolia. The Ourisia are acid soil-loving and hate lime; they are of creeping character and like damp soil. Division or seed.

OXALIS. Wood Sorrel. Dwarf Geraniaceæ represented in our country by the well-known *O. acetosella* which haunts shady woods and gives them in springtime its myriad of pearl-white cups. A large number of its cousins are distributed all about the Globe and Mr. Elliott went to the Falkland Islands to collect the beautiful *O. adenophylla* and *enneaphylla.* South Africa offers us a large collection too; these are generally tuberous and not hardy with us. The var. *atrosanguinea* of *O. corniculata* has very dark brown leaves and is one of the best plants for the paved walk and barren places; its dark foliage is a nice contrast to the light green of the type. Seed or division.

O. acetosella V; 1'0 cm.; white; N. Hem.; 1, 2. (A var. *rosea.*)
O. adenophylla V; 8 cm.; light rose; S. Am.; 6.
O. cernua IV-X; 15 cm.; bright yellow; S. Africa; 1.*
O. corniculata V-X; 10 cm.; yellow; Eur.; 1. (Var. *atrosanguinea.*)
O. enneaphylla V; 10 cm.; white, glaucous leaves; Falkland Isle; 1, 6. (A pink rose variety.)
O. floribunda V-X; 15 cm.; bright rose; S. Am.; 1'.* (Vars. *alba* and *fl. pl.*)
O. magellanica VI-IX; 5 cm.; white; S. Am., 1, 6.
O. Oregana VII; 20 cm.; pink; R. M.; 1, 6.*
O. rosea VIII; 20 cm.; rose; S. Am., 6.*
O. violacea VII; 15 cm.; red violet; N. Am.; 2, 3, 6.

OXYCCOCOS. See VACCINIUM.

OXYGRAPHIS. See RANUNCULUS.

OXYRIA. Mountain Sorrel. Dwarf alpine Rumex with reddish or light green leaves. Cool and shade in the rockery.

OXYTROPIS. Low-growing Pea flowers with dense tufts of multifoliolate leaves, creeping or erect stems, the flowers being collected in dense spikes yellow, purple, or pink. They have taproots and want deep, stony, well-drained soil. Seed.

O. campestris VI; 15 cm.; lemon yellow; Eur.; 1. L.
O. cyanea VI; 10 cm.; bluish violet; Ca.; 1.
O. fœtida VI; 20 cm.; whitish yellow; Al.; 6. P.
O. Halleri VI; 15 cm.; violet; Eur., Si., B. R.; 4, 6. P.
O. Lamberti VI; 20 cm.; purple; R. M.; 1, 6.
O. lapponica VI; 10 cm.; rose lilac; Eur., B. R.; 6.
O. montana VI; 5 cm.; purple rose; Eur.; 1, 6. L.
O. ochroleuca VI; 10 cm.; light yellow; Ca., Si.; 1, 6.
O. pilosa VI; 20 cm.; light yellow; Eur., Si.; 1, 4.
O. pyrenaica VI; 10 cm.; violet purple; Py., Sp.; 1, 4.
O. sulfurea VII; 20 cm.; yellow; Si.; 1, 6.
O. triflora VI; 5 cm.; violet; E. Al.; 4.

OZOTHAMNUS *rosmarinifolius.* Creeping evergreen shrub near to Helichrysum and Olearia, coming from Tasmania; white flowers. Peat; sheltered place. Cuttings or seeds.

PÆDEROTA. Belongs to the Rhinanthaceæ, and sometimes called Veronica. They are saxatile and stoloniferous, growing between hard rocks and sending their roots and stolons very deep into the stones. Mountains of Eastern Europe. There are two types, *P. Ageria* which has yellow flowers, and *Bona-Rota,* bright blue; and two varieties, both yellow flowering: *P. Churchilli* and *Zanichelii.*

Shady walls, damp crevices, leaf mould, and rather cool. Seed or division.

PÆONIA. Peony. Grown in gardens since the Middle Ages and now offered in many hundreds of varieties. The mountains of the Old World give us a nice collection of wild types for big rockeries and natural or wild gardens. Their large single flowers are a real beauty and sometimes more graceful than the double ones. Japan and China and even California pay their tributes to the garden with showy and delicate types. Farrer writes on Pæonies: "This glorious race is so far from being ill-fitted to the rock garden that the Pæonies are in reality queens of the stony mountain places, as anyone will know who has seen *P. officinalis* and *peregrina* in nature. Let all those, then, that are too wild and small to cope with the bloated beauties of the border, have their acknowledged place in the rock garden in some fitting corner of deep hollow or high cool ledges where they should be planted once and for all, and left for ever to grow larger and finer in deep and very rich soil." Division or seed (slow germinating if not quite fresh). They do not like to be disturbed.

P. albiflora VI; 80 cm.; white or pink; Si., Ch.; 1. (Fragrant.) (Numerous garden vars.)
P. anomala V; 60 cm.; light carmine; Si.; 1.
P. arietina VI; 60 cm.; dark carmine; Or.; 1.
P. banatica V; 80 cm.; pink; E. Eur.; 1.
P. Beresowskii V; 70 cm.; rose; Ch.; 1.
P. Broteri V; 60 cm.; crimson; Sp.; 1.

P. Brownii (*Californica*) VI; 40 cm.; dark red; Cal.; 1. (Fragrant.)

P. Cambecedesi V; 30 cm.; pink; Co., Baléares; 1.

P. corallina V; 80 cm.; bright pink; S. Eur.; 1.

P. coriacea V; 50 cm.; bright pink; Sp.; 1.

P. corsica V; 60 cm.; bright crimson; Co.; 1.

P. dahurica V; 60 cm.; rose; Si; 1'.

P. decora (*romanica*) V; 70 cm.; brilliant crimson; E. Eur.; 1.

P. Delavayi VI; 60 cm.; dark brown; Y.; 1. (Shrubby and fragrant.)

P. Emodi VI; 75 cm.; pure white; H.; 1.

P. humilis V; 50 cm.; bright red; S. Eur.; 1.

P. lobata V; 60 cm.; bright crimson; Sp., Portugal; 1.

P. lutea VI; 80 cm.; bright yellow; Y.; 1. (Shrubby and fragrant.) (Some beautiful hybrids with *Moutan*.)

P. macrophylla V; 70 cm.; yellow; Ca., Or.; 1.

P. microcarpa V; 50 cm.; rose; Sp.; 1.

P. Mlokosiewiczii V; 60 cm.; sulphur yellow; Ca.; 1.

P. mollis V; 60 cm.; dark crimson; Si.; 1.

P. Moutan VI; 1 m.; light rose, etc.; Ch.; 1. (Shrubby.)

P. obovata (*Japonica*) V; 60 cm.; pinkish white; Jap.; 1.

P. officinalis V; 60 cm.; bright pink; S. Eur.; 1. (Numerous vars. and hybrids.)

P. Pallasii V; 60 cm.; bright pink; Si.; 1.

P. paradoxa V; 60 cm.; crimson; S. Eur.; 1.

P. peregrina (*pubens*) V; 50 cm.; rose pink; E. Eur.; 1.

P. Russii VI; 60 cm.; bright pink; Co.; 1'.

P. tenuifolia VI; 50 cm.; bright crimson; Or., Ca., Si.; 1. (Vars. *alba, fl. pl.* and *rosea.*)

P. triternata V; 60 cm.; bright pink or white; Ca.; 1.

P. Veitchii VI; 50 cm.; light magenta; Ch.; 1.

P. Wittmanniana VI; 60 cm.; cream yellow; Or., Ca.; 1.

PAPAVER. Poppy. This genus is rich in annuals and biennials, but offers us also some of the most delicate and precious of the alpine plants—the Alpine

Poppy (*P. alpinum*) in all its forms and varieties. This is an exquisite child of our Alps where it represents the boreal Iceland Poppy (*P. nudicaule*). Our plant is exceedingly graceful and flowers a long time if well grown in meagre gritty soil in a sunny but cool place. All the Papavers are easy to reproduce from seed, but the alpine one dreads a rich soil, haunting always the moraines, the gritty, sandy slopes of the alpine regions. *P. alpinum* is the type of quite a group of varieties and local forms; it is not common, and in Switzerland it is a rarity (pilatus, Alps of Chateau-d'Oex, Urirotstock, and Rhetikon) always on lime. It is glabrous, with glaucescent, finely cut foliage; the stem is 20 cm. high, one-flowered, with a pure white and silky cup, yellow at the centre with numerous golden stamens, and deliciously fragrant. It is the moraine plant *par excellence.* The yellow type, *P. rhæticum* (*alpinum* var. *flaviflorum*) is dwarfer, dense foliated, and very hairy; the flower is orange yellow, on a 10 cm. high stem, sweet scented. It grows only on high moraines (Cambrenagletscher, Bernina, Tyrol). *P. pyrenaica* (*suaveolens*) is very hairy and has a yellow flower; it grows in the Pyrenees and on Spanish Sierras. *P. aurantiacum* is covered with ash-grey hairs and has big light yellow flowers; it grows in large masses and dense tufts on Mt. Ventoux (Provence) and on the Maritime Alps. It is sometimes found with white flowers (*P. Sendtneri*) on the Alps. *P. Burseri* is white-flowered and quite glabrous and grows on the Savoy Alps, south of Geneva. *P. Kerneri* is a little jewel from the Austrian Alps and the Balkans with very thin foliage and pale yellow flowers.

Now, all these different Alpine Poppies have hybridised and varied, and we have in gardens quite a range of all possible colours except blue.[27] We have in our alpine garden at La Chèvrerie above Nyon (Jura) quite a collection of colours and of shades and forms which flower from May to October! Beside the prime colours we have all the intermediate shades and some exquisite beyond imagination.

The Northern type, *P. nudicaule* (Iceland Poppy), is too well known to need description here. It is much stronger, much bigger, and much coarser than its alpine cousin; the leaves are broader and greener. It flowers easily in a half sunny disposition from May to October. But if you will keep the graceful character of the alpine child you must avoid the presence of *nudicaule* in the same garden; the bees are so busy with them that they perpetually cross the flowers, and you would soon feel that the delicate alpine plants had been submerged by the nordic one. *P. nudicaule* also has numerous varieties and forms according to its original country. *P. croceum* (*rubro-aurantiacum*) has very hairy leaves and stems and was brought to me from the Gobi Desert by the explorer Mangini in 1895. *P. radicatum* is densely cæspitose with immaculate white or yellow flowers; I got it from arctic America. A friend sent me lately from the Glacier National Park (Montana, U. S. A.) a very dwarf *P. nudicaule* which is half glabrous and has very short leaves.

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[27] See on the variation of the *P. alpinum:* H. Correvon, in *Catalogue des Pl. Jard.,* Bot. Alp. Linnæa, p. 19, Genève, 1901.

P. bracteatum and *orientale;* these enormous bright flaming stars of the Orient are too big for us; but, in any case, they may be a great help in the big rock garden when wanting brilliant colours. They ask for very deep soil for their long taproots. *P. pilosum, spicatum, Heldreichii,* and *strictum* belong all to an Oriental group of hairy perennials with glaucescent, coarsely dentate foliage and brick-red flowers. *P. rupifragum* and its North African var. *atlanticum* have nice brick-red or terra-cotta flowers all the summer through. *P. triniæfolium* from Cappadocia is a curious biennial with silver-glaucous leaves, cut and cut again into the finest silver fringe-work, forming a fine rosette of filigree-like foliage; the flowers are worthless and the plant sows itself in our garden, so that its biennial character does not affect us.

PARACARYUM. Offers us some beauties with sky-blue flowers in the way of those of *Omphalodes verna* but paler; many are biennial, but some are good perennials which can be recommended for large rockeries, borders, or the wild garden. Seed.

P. anchusoides VII; 60 cm.; pure azure blue; H., Or.; 1.
P. angustifolum (*azureum*) VII; 20 cm.; deep azure; Or.; 1.
P. incanum VII; 50 cm.; purple; silver foliage; Or.; 1.

P. lamprocarpum VII; 40 cm.; sky blue; Syria; 1.
P. myosotoides VI; 20 cm.; lilac blue; Or.; 1.
P. Reuteri VII; 15 cm.; violet blue; Or.; 1, 4.

PARADISIA (Anthericum). St. Bruno's Lily. The two alpine Lilies, *P. liliago* and *P. Liliastrum* with their vars. *giganteum* and *major,* are one of the glories of our mountain meadows. *P. Liliastrum,* with the delicious fragrance of the Madonna Lily, is our alpine Lily *par excellence* and is really the diminutive of *Lilium candidum.* It haunts the fresh meadows of the mountain regions all over Europe and especially in the South, where it covers large spaces in such abundance that at flowering time the soil seems to be covered with snow. *P. liliago,* with smaller flowers, grows lower down on sheltered rocky slopes and is scentless. Both have thick, fleshy roots and like a drained soil in sunny places. Seed (slow germ.).

PARIS *quadrifolia.* Belongs in the Medeola section of Liliaceæ, and is a guest of the darkest woods in Europe and Siberia; it is a dwarf plant with a four-leaved verticil on a 15-20 cm. high barren stem; unshowy greenish flower followed by large black bluish berry. *P. obovata* from Manchuria has obovate leaves forming a whorl of 4-8 leaves; *P. poliphylla* from the Himalayas has 8 leaves on a whorl. They all like a rich, deep humus in shady places. Seed (slow germ.) or runners.

PARNASSIA. Grass of Parnassus. Late flowering Saxifrageæ with white or yellow flowers belonging to the marshes, bogs, and damp meadows of the mountains in the Northern Hemisphere. They all want spongy, turfy, and moist, if not damp, soil and are propagated from seed or division.

P. alpestris (*alpina*); a big flowered, early flowering *palustris.*
P. asarifolia VII; 30 cm.; white; N. Am.; 1, 3, 9, 10.
P. californica VII; 30 cm.; pale yellow (5 cm. diameter); Cal.; 3, 9, 10.
P. Caroliniana VIII; 25 cm.; white; N. Am.; 3, 9, 10.
P. fimbriata VIII; 40 cm.; pure white; R. M.; 3, 9, 10.
P. grandiflora VIII; 30 cm.; white; N. Am.; 3, 10.
P. mysorensis VIII; 20 cm.; white; H.; 3, 9, 10.
P. nubicaule VIII; 20 cm.; white; H.; 3, 9, 10.
P. ovata (*Laxmanni*) VII; 10 cm.; white; H.; 3, 9, 10.
P. palustris VII-X; 25 cm.; white; N. Hemisp.; 1, 3, 9.
P. Wightiana VIII; 30 cm.; yellow; Y.; 3, 9, 10.

PAROCHETUS *communis.* Shamrock Pea, Stormproof Plant. One of the most exquisite blue flowers I ever grew. The blue is that of the marvellous creeping velvety metallic blue of *Gentiana bavarica,* fading into a dozen shades of emerald, opal, sapphire, and mild, sad pink. I quite understand the man who calls it the "jewel of the gods," as there is no lapis-lazuli which can be compared with it. It is a very creeping, half shrubby Pea flower with three-part leaves which close in the evening, and masses of these divine blue flowers each borne singly on a 5-8 cm. high stem. It likes half sun, a light, spongy, moist ground in a sheltered place, and flowers, at Floraire at least, from August till the next spring if taken up, planted in pots, and kept under glass. Runners or seed.*.

PARONYCHIA. Nailwort. Creeping and very dwarf carpeting plant which covers the soil in broad stretches in some mountains of Southern Europe and especially in the Pyrenees and Spanish Sierras. The "flowers" are nothing but the bracts that enclose the real blossoms and are white and shining. During the hot and dry days of August and September this is sometimes the only colour seen on the barren slopes. In the Val de Llo (Py.) the dry hills are covered with *P. polygonifolia* shining in the rising sun like the ice of a glacier. All species are furnished with these white, glistening bracts and all want a stony, dry, sunny place in the rockery or in the wall. The following are grown in gardens: *P. argentea, capitata* (here the bracts are condensed into dense heads), *imbricata, Kapellæ, macrosepala, polygonifolia,* and *serpyllifolia.* Seed or division.

PARRYA *Menziesii.* Parry Wallflower. Is an Erysimum of the Rocky Mountains making tufted rosettes of greyish leaves and, in early summer, on 25 cm. high stems, spikes of purple Wallflowers. Other Parryas are: *euricarpa, glabra, lanuginosa,* from E. Asia, and *pinnatifida* from Afghanistan. Seed.

PASSERINA. Dwarf shrubs near to Daphne and belonging to the Thymelæ; they inhabit Southern Europe; their flowers are small and greenish but the foliage is nice and of charming effect. *P. nivalis,* a dense evergreen, not exceeding 20 cm., recalls Empetrum and is one of the beauties of the limestone sunny slopes near Gavarnie (Py.). *P. calycina* and *dioica* adorn the rocks of the high Ariège and of the Eastern Pyrenees. All are wall or sunny hill plants; 4, 6. Cuttings or seed.

PATRINIA. Yellow Valerian. These Asiatic Valerians are seldom found in gardens. They have no special ornamental value, yet are interesting. Fresh, deep soil, half-shady situation. Division or seed.

P. gibosa VII; 30 cm.; yellowish; Si.; 1.
P. palmata (*triloba*) VII-IX; 30 cm.; bright yellow; Jap.; 1, 2.
P. rupestris (*intermedia*) VIII; 40 cm.; yellow; Si.; 1.
P. scabiosæfolia VII; 60 cm.; pale yellow; Si.; 1.
P. villosa VIII; 60 cm.; pinkish white; Jap.

PEDICULARIS. Lousewort. These sometimes brilliant, and always charming, rhinanthaceous plants are unfortunately one-half parasite and can only be grown if sown with alpine grasses. (Poa, Agrostis, Nardus, etc.) in porous, rather moist, rich humus. Prof. Heinricher, Director of the Botanic Garden at Innsbruck, formerly grew them with success, and in 1913 I inspected his cultures with great interest. But it is not easy work at all, and not everyone is able to carry out such experiments.[28]

PEGANUM *Harmala*. A zygophyllous plant of Southern Europe and the Orient forming a 40 cm. high bunch of dark green leaves, bearing lonely large greenish-white flowers, the whole strongly odoriferous. It is very stoloniferous and can be propagated by sprouts or from seed (slow germ.);

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[28] See Heinricher, *Die Aufzucht und Kultur der parasitischen Pfl.*, Jena, 1910.

deep light soil; very sunny and dry. A var. *erythmifolia.*

PELARGONIUM *Endlicherianum* is the one hardy Pelargonium here, but must be kept in a sheltered corner of the rockery or on a south-looking wall. It flowers July to September and gives large carmine blossoms. We got it from the Taurus. Cuttings or seed.

PELTANDRA *virginiana.* A North American Aroid growing in the water and bogs and bearing large dark green foliage and, in May, green spathes of blossoms about 12 cm. long. Cult. 3. Division or seed (slow germ.).

PELTARIA *Alliacea* and *turkmena.* White-flowered Crucifers, making large bushy plants 60-80 cm. and flowering in May and June. Sun and dry. Seed.

PENTHORUM *sedoides.* A North American Crassulad with erect stems (20-25 cm.) bearing a dense panicle of reddish flowers (IV); cult. 1, 4. Division or seed.

PENTSTEMON. Beard-Tongue. The Digitalis of North America, and some of them are glorious things. To appreciate their artistic value it is necessary to see them in Nature, on the barren slopes of Oregon, of California, or in the Mohave Desert, where I have seen large patches of celestial blue produced by some of them. What splendour on the desert plains and on stony banks are these marvels of colours! Red, vermillion, scarlet, yellow, violet, lilac, and blue, and such blues—some are metallic, others gentian or peacock blue. All flower in a time when the need for colours is great (VII-X).

But what a task to clarify the multitude of names published in the last 50 years! The confusion among them is so great that many gardeners refuse to collect these plants. There is as yet no monograph of Pentstemon; but here and there, American publications give us some light.[29] We grow at Floraire a large number of these species, but selection is necessary, as many are worthless weeds. The following are all admissible; they like light, well-drained soil, sun, and are easy to raise from seed, cuttings, or division. Of them Farrer says rightly: "Late summer and autumn see the climacteric of their blossom, which is brilliant in proportion as the life of the individual plant is inclined to be brief, Pentstemon usually having but a bush constitution, preferring a crowded hour of glory rather than a longer existence of mere usefulness." More than 200 species have been described and with one exception are North American.

P. acuminatus VII; 30 cm.; lilac blue and purple; N. Am.; 1.

P. alpinus (*Backeri*) VII; 25 cm.; clear blue and white; R. M.; 1.

P. ambiguus VII; 40 cm.; light rose; N. Am.; 1.

P. antirrhinoides VIII-X; 30 cm.; yellow; R. M., Cal.; 1.*

P. arenicola VII; 20 cm.; light blue; R. M.; 1.

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[29] See F. W. Pennell, *Scrophul. of Centr. Rky. Mount. States*, Wash., Smithson. Inst., 1920 (80 different kinds are described); Prof. F. N. Coville, *Botany of the Death Valley Exped.*, Govern. Print. Off., Wash., 1893; Jepson, *Flow. of Calif.*, Berkeley, 1916; Piper & Beattie, *Flora of Northwestern Coast*, Lancaster, Pa., 1915; the works of Asa Gray and the contrib. to U. S. Nat. Herb. of Smith., Wash., New Mexico, Utah, Nevada, etc.

P. aridus; a one-flowered blue var. of *P. laricifolius.*

P. arizonicus VIII; 80 cm.; reddish purple; N. Am.; 1.

P. azureus; a cinereous, pubescent *heterophyllus* of Cal.

P. baccharifolius IX; 50 cm.; scarlet; Texas; 1, 6.

P. (*Chelone*) *barbatus* VI-X; 1 m.; cinnabar scarlet; N. Am.; 1. (Vars. *hybrida, imberbe, rosea, Torreyi, violacea,* etc.)

P. brandegesi VII; 30 cm.; pale azure; N. Am., 1, 6.

P. cæruleus (*angustifolius*) VIII; 15 cm.; rose and azure; N. Am.; 1, 6.

P. centranthifolius VII; 60 cm.; scarlet; S. R. M.; 1.*

P. Clevelandi VII; 1 m.; red; Cal., Col. deserts; 1.*

P. Cobæa VII-IX; 50 cm.; bluish lilac pink; Texas; 1, 6.

P. cæruleo-purpurescens VII; 15 cm.; bluish purple; R. M.; 1.

P. collinus VII; 40 cm.; deep metallic blue; R. M.; 1', 6.

P. confertus VII; 30 cm.; pale yellow; N. Am.; 1, 6.

P. cordifolius VII; bright scarlet; S. Cal.; 1.* (Half climber.)

P. corymbosus VIII; 50 cm.; scarlet; Cal.; 1.* (Shrubby.)

P. crandallii VIII; 20 cm.; purple; Color., N. Mexico; 1.

P. crassifolius VIII; 50 cm.; lilac; R. M.; 1.

P. cyananthus VIII; 60 cm.; dark purple; N. Am.; 1.

P. Davidsoni VII; 10 cm.; pink or blue purple; R. M.; 1, 4, 6.

P.,deustus VIII; 25 cm.; blue violet; R. M.; 1.

P. diffusus VII-IX; 50 cm.; bluish violet; N. Am.; 1.

P. Digitalis (*lævigatus*) VIII; 1 m.; white; East U. S.

P. Douglasi VI; 10 cm.; blue purple; Cal., R. M.; 4, 6.

P. Eatoni VII; 50 cm.; bright crimson; Cal.; R. M.; 1, 6.

P. eryanthera VII-VIII; 30 cm.; purple violet; R. M.; 1.

P. exilifolius VIII; 30 cm.; white; R. M.; 1.

P. Florariensis; a light azure heterophyllus dwarfer than the type.

P. Fremontii VII; 20 cm.; purplish blue; R. M.; 1, 4.

P. fruticiformis VIII; 50 cm.; pink and pale rose; Cal.; 1.*

P. fruticosus VII; 30 cm.; dull purple; R. M.; 1, 4.

P. gentianoides VIII-XI; 80 cm.; lilac blue; N. Am.; 1.* (One of the mothers of the beautiful garden hybrids.)

P. glaber (*speciosus*) VII-X; 60 cm.; clear blue; N. Am.; 1, 3.

P. glandulosus VI; 50 cm.; violet lilac; N. Am.; 1.

P. glaucus VII; 60 cm.; pale lilac; R. M.; 1.

P. Gordoni splendens VII-IX; 40 cm.; bright metallic blue; N. Am.; 1.

P. gracilentus VIII; 50 cm.; blue; Cal.; 1.

P. gracilis VII; 30 cm.; lilac; R. M.; 1, 3.

P. grandiflorus VIII; 60 cm.; lavender blue; N. Am.; 1.

P. Hallii VIII; 30 cm.; red violet; N. Am.; 1.

P. Hartwegii; with *gentianoides* one of the parents of the garden hybrids.

P. heterophyllus VI-IX; 40 cm.; intense metallic blue; Cal., R. M.; 1.

P. humilis VII-IX; 15 cm.; dark blue; R. M.; 1, 4.

P. Jamesii (*similis*) VIII; 18 cm.; white and blue; West U. S.; 1, 6.

P. Jeffrayanus VII; 30 cm.; purplish blue; Cal.; 1.

P. Kingii VII; 20 cm.; purple; South Am.; 1.

P. labrosus VII; 1 m.; very brilliant scarlet; S. R. M.; 1.

P. lætus VII; 25 cm.; bluish purple; Cal.; 1.

P. lævigatus. See *Digitalis.*

P. laricifolius VII; 30 cm.; purple blue; N. Am.; 1.

P. Lemmonii, Bush Beard-Tongue, VII; 80 cm.; dull yellow; Cal.; 1.

P. linarioides VI-VIII; 15 cm.; purple and reddish lilac; R. M.; 1, 4.

P. Menziesii VI; 10 cm.; purple violet; R. M.; 1, 4.

P. miniatus VIII; 50 cm.; bright scarlet; Mexico; 1.*

P. Moffattii VIII; 50 cm.; purplish blue; R. M.; 1.

P. montanus VII; 15 cm.; purple and pink; R. M.; 1, 4.

P. Murrayanus VIII; 80 cm.; scarlet red; Texas; 1.*

P. Newberryi, Mountain Pride, VII-IX; 40 cm.; bright red; Cal.; 1.

P. ovatus VII-X; 40 cm.; purplish blue; R. M.; 1.

P. Oweni VII; 15 cm.; blue violet; R. M.; 1, 4.

P. Palmeri VII; 1 m.; pale purple; Arizona, Nevada; 1.

P. procerus VII; 10 cm.; blue violet; R. M.; 1.

P. pruinosus VII; 25 cm.; deep indigo blue; Columbia River; 1.
P. pseudo-humilis VII; 25 cm.; blue; R. M.; 1.
P. pubescens VII-IX; 50 cm.; whitish purple; N. Am.; 1.
P. puniceus VI; 75 cm.; bright scarlet; Mexico; 1.*
P. pygmæus; a dwarf var. of *pubescens.*
P. radicosus VII; 20 cm.; dark blue; Colorado; 1.
P. Rattanii VII; 30 cm.; lavender blue; Cal.; 1.
P. Richardsoni VII; 40 cm.; violet blue; N. Am.; 1.
P. Rœzlii VIII; 20 cm.; bluish purple; Cal.; 1.
P. rotundifolius VII; 60 cm.; bright red; Mexico; 1.*
P. rubricaulis VIII; 60 cm.; bright carmine; N. Am.; 1.
P. rupicola VI; 10 cm.; deep rose; North R. M.; 4.
P. Rydbergii VII; 30 cm.; pale violet; R. M.; 1.
P. Scouleri (*Menziesi* var. *Scouleri*) VIII; 20 cm.; lavender blue; R. M.; 1.
P. secundiflorus VII; 40 cm.; blue; Wyoming, New Mexico; 1.
P. spectabilis VI; 50 cm.; violet blue; N. Am.; 1.
P. strictus VII; 40 cm.; dark lilac; N. Am.; 1.
P. suffrutescens VII; 50 cm.; violet rose; Utah, Colorado; 1.
P. ternatus VII; 1 m.; terra cotta; S. Cal.; 1.*
P. triphyllus VII; 50 cm.; violet; N. Am.; 1.
P. unilateralis VII; 80 cm.; pink and blue; R. M.; 1.
P. Utahensis VII; 1 m.; violet blue; N. Am.; 1.
P. venustus VI; 50 cm.; rich violet; N. Am.; 1.
P. virgatus VIII; 40 cm.; bluish lilac; N. Am.; 1.
P. Watsoni VII; 30 cm.; violet purple; R. M.; 1.
P. Wrightii VI; 50 cm.; lilac rose; R. M.; 1.

PERICOME *caudata.* A light yellow Ageratum with a rather disagreeable smell, very brilliant in the summer months; 80 cm. high, much branched. This is a child of New Mexico wanting full sun, deep ground, and a sheltered place. Seed or cuttings.

PERNETTYA. This group of ericaceous shrubs is rebellious of our Continental cultures, especially where lime predominates, being a pure acid-soil plant. In the West of Europe and in England Pernettya grows freely; evergreen dwarf, bushy shrubs bearing an abundance of berries in lovely shades of white, blue, violet, pink, grey, crimson, and scarlet. They belong to antarctic countries, and must be grown like Rhododendrons. Seed and cuttings.

PEROWSKYA *atriplicifolia.* A precious resinous aromatic half shrub with strong Eucalyptus smell, 1 m. high, from Afghanistan. Greyish foliage and masses of long panicles of lavender-blue flowers from July to November. They want a very sunny corner, light, sandy loam, or the rockery. Offsets, cuttings, or seeds.

PETALOSTEMON *candidus, tenuifolius,* and *villosum.* Prairie-Clover. Graceful Pea flowers with very small blossoms in dense heads, flowering through the summer; full sun; North American. Seed.

PETASITES or TUSSILAGO. Butterbur. Big-leaved Composites which grow in damp places or the underwood in the mountain regions of the Northern Hemisphere. I was considerably puzzled in Oregon and Washington by seeing, all along the railway line, some Petasites with elegant palmate or deeply cut leaves. A very strange sight for an European botanist. The Petasites are formidably invading and must be kept in some damp and shady places where they cannot damage other things.

P. albus II-III; 30 cm.; white; Eur., Ca., Si.; 2.
P. fragrans. See *Nardosmia.*
P. frigidus (*nivalis*) III; 10 cm.; purplish white; N. W. Am.; 1, 2.
P. giganteus III; 1 m.; cream white; Jap.; 3, 2.
P. niveus II-III; 40 cm.; pure white; Eur.; 1, 2.
P. ochroleucus III; 50 cm.; yellowish; Ba., Or.; 1, 3.
P. officinalis III-IV; 50 cm.; light lilac; Eur., Ba., Si.; 1, 3.
P. palmata IV; 80 cm.; pink and white; N. Am.; 1, 2, 3. (Fragrant.)
P. speciosa IV; 40 cm.; lavender colour; N. W. Am.; 1, 3.
P. spurius III, 40 cm.; yellowish; Eur.; 1, 3.

PETROCALLIS *pyrenaica.* See DRABA.

PETROCOPTIS *Lagascæ.* See LYCHNIS.

PHACA. Dwarf shrubby alpines near to Astragalus with violet, yellow, or purple flowers, which want a deep soil and half sun on the rockery. *P. alpina, Astragalina, australis,* and *frigida.* They are all somewhat difficult to acclimatise. Seed.

PHACELIA. Graceful and sometimes brilliant (especially in annual species) Hydrophilleæ of Northwestern America, of which two only, *P. idahoensis* and *sericea,* are really perennial. I found the last one near Ukiah, Cal., along the road where the nice greyish tufts covered with blue flowers are a beautiful decoration. They like warm, well-drained, sandy soil. Seed.

PHALANGIUM. See PARADISIA.

PHILESIA *magellanica* (*buxifolia*). A great beauty, but this marvel, which comes from the south of

Chili, is not for our Continental climate. It hates lime and cannot stand our winters. In England and in maritime climates it thrives very well and I have often admired with jealousy that splendid lilaceous shrublet in some English garden. The plant does not exceed 30 cm. high, has dark evergreen foliage and, in late summer, bright rose, waxy Lapageria-like flowers. Farrer, who grew it in his Yorkshire garden, says: "It is quite hardy but likes a very cool and shady place distinctly on the damp side in summer and rather high upon the rock-work, that its pendent bells may best strike the eye amid the arches of the shoots; its soil should be a very rich and clammy mixture of sand, leaf-mould and peat, with lumps of sandstone dug in for the roots to grip . . . when established Philesia may be propagated by pieces pulled off and restarted but is otherwise best left alone."

PHLOMIS. Jerusalem Sage. Coarse Labiates with the flowers in whorls on square stems. Most of them are too big for the rockery, but they are good ornaments for the natural garden. They have generally large greyish foliage and yellow or pink flowers. Among the biggest are: *P. alpina* from the Altai with dark carmine flowers on 1.5-2 m. high stems; *P. betonicifolia* from Turkestan, with flesh rose flower; *P. aurea* from Or., 1 m. high, with gold yellow flowers; *P. cashmiriana,* 60 cm. high, pale lilac, from H.; *P. chrysophila,* 1 m., from Or., with light yellow flowers; *P. fruticosa* (1 m.), bright yellow from So. Eur.; *Samia* (80 cm.), from Or., with gold and pale yellow flowers. There are some lower ones which can be used for the rock garden: *P. armeniaca,* yellow (30 cm.); *Herba-Venti* (30 cm.), with pale and bright pink flowers, from S. East Eur.; *Lychnitis,* with bright yellow flowers (40 cm.) and *rigida* (30 cm.), from Or., with rose flowers. All flower from VII-X and are strong, easy-growing plants wanting only much sun and a dry, sheltered situation. Seed and division.

PHLOX. This is a large group of jewels deserving its Greek name (phlox = flame) and being exclusively American. No word can convey the charm of the broad patches of colour made in the desert by these Mosspinks—stretches of pink, violet, or purple carpet; nor have I words to describe the pink beauty of the underwoods seen in the vicinity of Des Moines, Ia., in Oregon, and near St. Louis, Mo. With such beauties at their door our American friends have nothing to envy the Europeans. The Phloxes haunt all North America, and grow especially well in the United States. Excepting *Phlox paniculata* and its parents, *P. pilosa,* etc., they are low creeping and carpeting plants. Cuttings, division, and seed (slow germ.).[30]

P. adsurgens V; 10 cm.; pinkish white; R. M., Cal.; 4.
P. alyssifolia VI; 15 cm.; pale lilac; Assiniboia, N. Am.; 1, 4.
P. amabilis V; 8 cm.; white; N. Am.; 1, 4.
P. amœna (*procumbens*) V; 25 cm.; pink lilac; Arizona; 1.

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[30] For descriptions of Phlox, see *Monograph of Polemon.* A. Brand, in Engler, *Pfl. Reich.,* Vol. IV, p. 250.

P. argilacea VI; 40 cm.; lilac; U. S.; 1.

P. austromontana V; 10 cm.; white and purplish; Death Valley; 6.

P. Bernardina (*superba*) V; 20 cm.; rose purple; R. M.; Cal.; 1.

P. bifida V; 20 cm.; pale purple; Ill. and Mo.; 1.

P. bryoides V; 5 cm.; white; Col. desert, Utah; 4.

P. cæspitosa IV; 5 cm.; lilac, variable; New Mex. to Wash.; 1, 4.

P. canadensis. See *divaricata.*

P. canescens; a densely white floccose Calif. var. of *Douglasi.*

P. cernua V; 10 cm.; white and purple; Col.; 1.

P. condensata V; 8 cm.; white; Col. and Oreg.; 1, 4.

P. dasiphylla V; 10 cm.; bright pink; Col.; 1, 4.

P. densa V; 8 cm.; light carmine; R. M.; 1, 4.

P. diffusa V; 15 cm.; pale violet; R. M.; 1.

P. divaricata (*Blue Phlox*) IV; 20 cm.; lilac blue; Atlant. N. Am.; 1. (Numerous vars. *Phlox Arendsi* of gardens are hybrids of this with *paniculata.*)

P. dolicantha V; 20 cm.; pink red; Cal. deserts; 1, 4.

P. Douglasii (*Andicola*) V; 10 cm.; rich lilac or pink; R. M.; 1, 4.

P. glaberrima VI; 60 cm.; pink; Atlant. N. Am.; 1.

P. hirsuta V; 10 cm.; white; Cal.; 1, 4.

P. Hoodii IV; 5 cm.; white; R. M.; 4, 6.

P. insignis; a hybrid, *paniculata* x *maculata.*

P. Kelsayi V; 30 cm.; bright lilac; R. M.; 1.

P. lanata V; 5 cm.; brilliant purple; R. M.; 4, 6.

P. longifolia V; 20 cm.; pink; R. M.; 1.

P. maculata, Wild Sweet William, VII; 80 cm.; magenta; Atlant. N. Am.; 1.

P. nana IV; 20 cm.; variable; So. R. M.; 1.

P. Nelsoni of gardens is a white *subulata.*

P. nivalis; also a pure white form of *subulata.*

P. ovata VI; 20 cm.; pink; Atlant. N. Am.; 1.

P. paniculata; the high fragrant Phlox of gardens which, crossed with *maculata* and others, gave us one of the marvels of our herbaceous borders. The type grows in the E. and Center of N. Am. and has purple flowers on 1 m. high stem.

P. pilosa, Prairie Phlox, VI; 30 cm.; bright pink; Atlant. N. Am.; 1.

P. reptans. See *stolonifera.*

P. Richardsoni IV; 10 cm.; lilac blue; R. M.; 1, 4.

P. setacea. See *P. subulata.*

P. speciosa V; 25 cm.; red to lavender; Cal., R. M.; 1.

P. Stellaria VI; 20 cm.; pale blue; R. M.; 1, 4.

P. stolonifera (*reptans* or *verna*) V; 15 cm.; carmine; Atlant. N. Am.; 1.

P. subulata (*setacea*) IV; 10 cm.; blue or pink; Atlant. N. Am.; 1, 4. (Very numerous natural and garden vars. *ciliata, frondosa, hentzii, nivalis, G. F. Wilson,* etc.)[31]

P. superba. See *Bernardina.*

P. verna. See *stolonifera.*

Numerous garden vars. have been offered for 50 years or more in the catalogues, but none is so brilliant and perfect for rockeries as "Vivid," a bright rose-colored flower with a carmine eye which produces masses of blossoms in May; it is very slow growing.

PHYGELIUS *capensis.* An elegant Scrophulariad from South Africa with dark green shiny foliage, 40-50 cm. high red stems and numerous Mimulus-like red flowers with green spots inside (VI-XI); good sandy loam, sun. Division or seed.

PHYLODOCE. See MENZIESIA.

PHYSALIS. Ground Cherry. A solanaceous plant that invades the soil if planted in the garden and is rather a troublesome weed. Its unique beauty lies in the bright orange-red bladder-like calyxes, which enclose the Cherry-like fruit; good for winter decoration. *P. Alkekengi,* an European kind, grows in our vineyards and along the edges. Its Asiatic cousin *P. Franchetti* (Japanese Lantern) has bigger fruits of brighter shining vermillion red. Suckers or seed.

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[31] See Dr. Edgar T. Wherry, *The Easter subulate-leaved Phloxes in Bartonia,* Nov. 11, 1929.

PHYSARIA *dydimocarpa.* A saxatile Crucifer from the Rocky Mountains with silvery leaves and a 10 cm. high stem bearing clear yellow flowers. Colorado, 4. Seed.

PHYSOCHLAINA *orientalis.* A kind of Henbane from the East which has a big, fleshy root, tall branches with dark green foliage, bearing dull violet, copper-blue solanum type flowers of no garden value. Deep soil, sun. Seed.

PHYTEUMA. Rampion. A group of plants belonging to the Campanula family and offering many good plants for the rock garden.[32] The flowers are in dense heads or spikes, surrounded by an involucre of bracts usually blue. This genus is spread over Europe and Western Asia in mountain districts. Numerous white-flowering forms. Seed.

P. austriacum VI; 10 cm.; dark blue; E. Al.; 4, 6.
P. betonicifolium VI; 40 cm.; blue; S. Eur.; 1, 4. P.
P. canescens VI; 80 cm.; light blue; E. Eur.; 1.
P. Carestiæ (*serratum*) VI; 10 cm.; dark violet; Co.; 4, 6.
P. Charmeli VII; 15 cm.; blue; S. Eur.; 1, 4.
P. comosum VI; 8 cm.; dark blue; S. E. A.; 4, 10. L.

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[32] The Phyteuma group is rather intricate. Those who like these interesting plants can consult: Dr. S. Schulz, *Monog. der Gatt. Phyteuma,* Geisenheim, 1904.

P. globulariæfolium V; 5 cm.; violet blue; high Alps; 4, 8, 9, 10.

P. Halleri VI; 60 cm.; dark violet; Al., Py. Cp.; 1, 2, 7.

P. hemisphæricum V; 8 cm.; violet blue; Al.; 4, 8, 10. P.

P. humile V; 5 cm.; violet blue; Al.; 4, 8. P.

P. limonifolium VII; 1 m.; lilac blue; S. Eur.; 1.

P. Michelli VI; 50 cm.; blue; S. Alps; 1.

P. nigrum VI; 40 cm.; dark violet; Eur.; 1.

P. orbiculare V-VII; 25 cm.; blue; Eur.; 1, 7.

P. pauciflorum VI; 5 cm.; dark blue violet; high Al.; 4, 10. P

P. Scheuchzeri V; 15 cm.; dark blue; S. Eur.; 4, 6.

P. scorzoneræfolium V; 60 cm.; blue; S. Al.; 1.

P. Sieberi V; 10 cm.; pale blue; E. Al.; 4, 6; L.

P. spicatum V-VII; 50 cm.; azure or white; Eur.; 1, 2.

P. virgatum V; 10 cm.; violet blue; Gr.; 4, 6.

P. Wagneri V; 40 cm.; dark blue; Cp.; 1.

PINGUICULA. Butter-Wort. Small carnivorous plants with fat, entire leaves in a rosette, growing on wet ground and bearing yellowish or purple or rose flowers on a leafless peduncle. They ask for abundant moisture in the soil; in winter the leaves disappear and a fat nodule of greenish scales alone remains underground like a kind of pseudo-bulb. The flower is heliotropic, and follows the sun. The leaves catch numerous small flies on a hot day.

P. alpina V; 10 cm.; yellowish white; Al., Eur.; 3, 9, 10.

P. flavescens V; 10 cm.; yellowish; E. Al.; 3, 9, 10.

P. grandiflora V; 15 cm.; blue lilac and white; Eur.; 3, 9, 10.

P. gypsicola VII; 10 cm.; violet; Mexico; 3, 9, 10.*

P. hirtiflora VI; 15 cm.; light pink; Gr., Ba.; 3, 9, 10.

P. leptoceras. See *grandiflora.*

P. longifolia IV; 10 cm.; light violet; S. Al., Py., Sp.; 9, 10.

P. macroceras V; 10 cm.; blue lilac; N. W. Am.; 3, 9, 10.

P. Reuteri VI; 15 cm.; light rose, red capsule; Savoy and Jura; 1, 9, 10.
P. spatulata VI; 15 cm.; lilac violet; Si.; 3, 9, 10.
P. valisneriæfolia V; 20 cm.; lilac; Sp.; 3, 9, 10.
P. vulgaris V; 15 cm.; deep violet; Eur., Ca., Si.; 3, 9, 10.

PLANTAGO. Plantain. Some can be admitted to the rock garden, for instance the beautiful *P. argentea* from Eastern Europe, *nivalis* from Spain, and the small alpines, *P. alpina* and *P. montana.*

PLATYCODON (Balloon Flower). This is one of the marvels which we owe to Japan. The large, rich, deep blue, leathery flowers are one of the brightest creations of the summer. The type is *P. grandiflorum* with its large dark blue flowers on 60 cm. high leafy stems; in the garden it varies and we have some pure white forms, some light azure, and some with a double corolla. *P. glaucum* has bluish leaves; and *P. autumnale* flowers VIII-X, on a 1 m. high stem. The best of all is *P. Mariesii,* not exceeding 30 cm. high, which "bravely upholds its noble open fleshy-looking bells throughout the autumn." It varies like the others in many shades; there is a big-flowering var., *P. macranthum.* Culture easy; the big, fleshy roots fear only stagnant damp in winter; light loam in a well-drained soil and sun. We have some 20-year-old plants. Seed.

PLUMBAGO *Larpentæ* (*Ceratostygma plumbaginoides*). A dwarf, bushy stoloniferous plant from China, not exceeding 25 cm. in height, with *Gentiana verna* blue flowers in close trusses at the end of the shoots; VIII-XI; shade or half shade or even sun; likes a well-drained light soil. Division. The *P. Willmottiana,* from Central China, is an improvement; it is a shrubby plant 1 m. high with bigger flowers and wants a sheltered place.

PODANTHUM. See PHYTEUMA.

PODOPHYLLUM. May-Apple. A Berberid with creeping rhizomes, big ornamental leaves, and unshowy flowers. The Himalayan, 60 cm. high, *P. Emodi,* has large glossy umbrella-shaped leaves on tall stems which are really beautiful; flowers yellowish white, followed by a fruit like an oblong persimmon of brilliant scarlet. There are two vars.: *Leichtlini* and *majus,* both much bigger. *P. peltatum,* North American, is very common in the underwoods of New England, reaching out even to the meadows; deeply lobed leaves and lemon-yellow fruits! China sent us lately *P. playanthum* and *P. versipile* with very deep leaf-lobes and hanging clusters of dark red flowers. They all want peat and shade, and can be divided or raised from seed.

POLEMONIUM. Greek Valerian. These fragrant mountain plants belong in a great part to America and few are native in Europe and Asia. They are magnificent in some parts of the Western American deserts, where they shine like stars in the dark sky. They generally are handsome, very graceful, and want no great care; they like loam and, if possible, a cool position. Variable in colours, the blue often having some white vars. Division or seed.[33]

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[33] See A. Brand, Polemoniaceæ, Engler's *Pfl. Reich,* Vol. IV, p. 350.

P. boreale V; 20 cm.; blue; A. R.; 1. (Fragrant.)
P. (*Gilia*) *Brandegei* VI; 25 cm.; yellow; Col.; -
P. campanulatum V; 20 cm.; blue; Finland, Lapland; 1.
P. carneum VI; 50 cm.; flesh rose; Pacif. U. S.; 1.
P. cæruleum IV-VII; 50 cm.; blue; Eur., Si.; 1, 3, 7. (Fragrant.) (Some vars. *alba, gracile, Himalayanum, pinnatifidum, villosum.*)
P. confertum VI; 20 cm.; bright blue; Pacific N. Am.; 1, 6.
P. elegans; a beautiful dwarf yellow and blue *viscosum* from Mount Rainier.
P. eximium VI; 20 cm.; light blue; R. M.; 1, 6.
P. filicinum VII; 80 cm.; blue; New Mexico; 1, 6.
P. flavum VII; 60 cm.; yellow; R. M.; 1, 6.
P. foliosissimum VI; 80 cm.; blue; R. M.; 1.
P. grandiflorum VI; 30 cm.; lilac; Mexico; 6, 10. (Rare.) (There is a var. *luteum* on the Sierra de Pachuraka.)
P. humile VI; 20 cm.; blue; N. Am., Can.; 1, 6.
P. lanatum (*capitatum, arcticum*) VI; 10 cm.; bright blue; A. R.; 6, 10.
P. Lemonii VI; 10 cm.; blue; Cal., R. M.; 6, 10.
P. mellitum VII; 20 cm.; blue or white; R. M.; 1, 6.
P. molle VI; 30 cm.; sky blue; R. M.; 1.
P. occidentale; a rampant var. of *cærulea* from the Rockies.
P. pauciflorum VII; 40 cm.; yellow; Sierra Madre, Mexico; 1.
P. pulcherrimum VI; 20 cm.; blue; R. M.; 1, 6.
P. reptans, Jacob's Ladder, V; 20 cm.; blue; N. E. Am.; 1.
P. Rhæticum; a big-flowering *cæruleum* from the Engadine.
P. Richardsoni; a dwarf var., 15 cm. high, of *lanatum.*
P. viscosum V; 5 cm.; bright blue; R. M.; 6, 9, 10.

POLYGALA. Milkwort. Here is an interesting group of plants, with irregular flowers in terminal racemes, which is widely spread over most parts of the globe. The mountain ones are either dwarf herbs or small creeping shrublets, very desirable for the rock garden. Cuttings, division. or seed (slow germ.). The herbaceous types, *P. alpestris* and *P. calcaræa,* are dwarf, tufted with sky-blue flowers, while the Oriental and meridional *anatolica, nicæensis,* and *Papilionacea* with bright pink or violet flowers are half shrubby. The best group for us is the *P. Chamæbuxus* with its var. *Rhodoptera* (*atropurpurea*) whose flowers are yellow and bright pink. The type is found all over Southern Europe on limestone mountains in stony soil or between moss. The pink var., which is a real beauty, grows in the mountains of Italian Switzerland and of Northern Italy. *P. Vayredæ* of Spain is an exceedingly nice plant with narrow bright green leaves, and bright pink and golden yellow flowers. The three last plants are very stoloniferous and prefer a half-shady position. They can be increased by cuttings, in sand, in August. *P. rupestris* is a rare minuscule shrub from Southern Europe with small, whitish flowers and narrow foliage. All these shrubby Polygalas are evergreen. We have from New England and Atlantic North America a beautiful evergreen shrubby *Polygala, pauciflora,* near to *Rhodoptera,* with pure carmine flowers without yellow. It grows there in rich, moist woods.

POLYGONATUM (*Convallaria*). Solomon's Seal. Not brilliant in appearance but, being woodland children, they are good for shady corners, the wild garden, and the rockery; even in the borders their opulent arching sprays bearing small hanging clusters of greenish bells are beloved. Their fat rhizomes run in all directions, and, with time, they invade large spaces if they are left to themselves. Our two common species are: *P. vulgare* (*biflorum* or *officinale*) and *P. multiflorum* whose arched stems reach 50-60 cm.; they have deep green-blackish berries. We find in our mountain regions, on very shady places, *P. verticillatum,* which has flowers and leaves in whorls on the stem and bears in autumn bright red berries. From North America we have a far higher form called *P. giganteum* which is an exaggerated *multiflorum* reaching 1 m. and more. *P. japonicum* has white and pink bells and *P. oppositifolium,* from the Himalayas, pinkish flowers. Siberia sent us a small rose-flowered *P. roseum,* and the Himalayas *P. graminifolium* with purplish bells. They all want shade or half shade and are propagated by division or seed (slow germ.).

POLYGONUM. Fleeceflower or Knotweed. Rather too big and invading for the rockery but do well in the wild garden. Some, however, can be admitted and are useful as rock plants. *P. alpinum* has large pure white panicles of flowers and is one of the nicest elements of the alpine zones in Piedmont and the Southern Alps; it wants a deep, stony soil rather moist, and flowers from May to June. *P. virginianum* of North America and *P. Weyrichii* from Japan are near to it but bigger. *P. molle,* despite its ugly leaves, is good for its delicate deep red stems and bright, pure white flowers in large panicles coming in the late autumn; damp soil. *P. amplexicaule,* with red flowers, and *P. Campanulatum,* with bright pink and pale rose blossoms coming in the fall, are some of the best decorations for the wild garden and for the bog. *P. Bistorta* of the boreal hemisphere, well known to every alpinist because it forms large fields of beautiful rose in the cool meadows, can be planted on half shady or moist places in the rockery, while its American cousin, *P. bistortoides,* with deeper rose flowers and shorter stem, can be put in peat or leaf mould. In the dwarf and creeping group we have *P. Brunonis* (*affine*) from Nepal which forms large dwarf patches of light green foliage and pale rose flowers in short spikes and *P. capitatum* from the low Himalaya region, not quite hardy here, creeping, carpeting the soil with its long rampant stems bearing nice marbled and spotted foliage and little pink heads of flowers all the summer through. *P. Emodi,* from the same country, with elegant narrow evergreen foliage and bright pink spikes of flowers; *P. equisetiforme* from Corsica, suggesting an Ephedra or an Equisetum by its form and stature, gives in summer masses of small white flowers. It likes a sheltered, sunny situation on the rockery. *P. Griffithi* from Bohtan, with crimson racemes of flowers (50 cm. high), near to *sphærostachyum. P. romanum* is a very wild creeping plant from the Roman ruins at Rome where it covers large spaces—we use it here, being not higher than 2 or 3 cm., for carpeting barren slopes, paving walks, etc., on very sunny and dry places. *P. sphærostachyum* is a dwarf, very handsome form of *Bistorta* with bright carmine spikes of flowers in autumn (acid soil). *P. vacciniifolium,* Himalayan, is not quite hardy at Floraire, with lovely evergreen foliage in the fall taking on the tints of the New England forests and giving innumerable rose-pink spikes of flowers. *P. viviparum,* a high alpine (and poor thing indeed), but interesting with its spikes of white flowers turning promptly into bulbils which, falling over the ground, reproduce the plant. And, this must be said, grows in the highest and meagrest alpine places and abounds all over the arctic and boreal regions. All are propagated by cuttings, division, or seed.

POLYSCHEMONE. See LYCHNIS *nivalis.*

POTENTILLA. Cinquefoil. A big, very big, genus containing several hundreds of herbaceous plants with yellow, white, pink, or red flowers, being sometimes creeping runners, other times shrubby or bushy perennials; it extends over the whole of the Northern Hemisphere to the arctic regions. A large number are without interest for us; those only which prove good for the rock garden are mentioned. First, the group of the shrubby species which mostly belong to Asia and one to the European mountains. Seed, division, and cuttings.

Shrubby Section.—The type is *P. fruticosa,* a plant which was left in Europe after the glacier period. I found it, beautiful, in the Eastern Pyrenees near the rivulets and there, indeed, it is a real beauty, hanging its branches over the running water with all its golden stars reflected in them. It goes far north to Asia (Ch., Si.), to North America, etc. In Central Asia there has been found some forms or cousins of it. The best of all seems to be *P. Farreri,* a dense shrub 80 cm.-1 m. high with elegant branches covered in May and June with large bright yellow flowers. Another marvel, with silvered leaves and big yellow flowers, is *P. Beesii,* not exceeding 60 cm. high (at Floraire at least). *P. Purdomi* is a dwarf shrub with sulphur-yellow flowers. *P. Vilmoriana* has cream-yellow blossoms. *P. Veitchii* has white flowers and silvery foliage. *P. arbuscula* and *P. dahurica* are two small Siberian 15-30 cm. high bushes with yellow or yellowish flowers. *P. Friederichseni* is a hybrid *fruticosa* x *dahurica* and *P. floribunda* is a procumbent var. of *fruticosa* with a special abundance of paler flowers. This group is of easy culture in any rather moist loam.

Herbaceous Perennial and Creeping Section.—The silver-leaved species are marked (silv.).

P. alba IV; 10 cm.; white; Eur., Ca.; 1, 2.
P. alchemilloides V; 10 cm.; white; Py.; 1, 4.
P. alpestris V; 15 cm.; bright yellow; Eur.; 1.
P. ambigua VII; 8 cm.; gold yellow; H.; 1, 6.
P. Anserina VI; 20 cm.; yellow; Eur., N. Am.; 1, 3; invading. (silv.)
P. apennina V; 20 cm.; yellow; Ap.; 1.
P. argyrophila VI; 15 cm.; yellow; H.; 1.

P. atrosanguinea V-X; 80 cm.; dark blood red; H.; 1. (Var. *Gypsoni,* a bigger flower, bright scarlet.)
P. baldensis V; 8 cm.; white; E. Al.; 1, 4.
P. bifurca V; 8 cm.; yellow; E. Eur., Asia; 1, 6.
P. Breweri V; 5 cm.; yellow; Cal., R. M.; 4.
P. caulescens V; 15 cm.; white; Al., Ap., Py.; 4. L. (silv.)
P. cinerea (*subacaulis*) VI; 5 cm.; yellow; W. Al.; 1, 4. (silv.)
P. Clusiana V; 10 cm.; white; E. Al., Gr.; 1. L.
P. crassinervia VI; 15 cm.; golden yellow; Co.; 4, 5. (silv.)
P. deorum VI; 10 cm.; white; Gr.; 4, 6. (silv.)
P. erecta VI-IX; 40 cm.; yellow; Eur.; 1, 7.
P. eriocarpa VI; 15 cm.; golden yellow; Tibet; 6.
P. Fenzli VI; 5 cm.; yellow; Or.; 1, 4. (silv.)
P. frigida V; 5 cm.; yellow; high Al., N. Am.; 6, 9, 10.
P. fulgens VI; 10 cm.; bright yellow; H.; 6, 9, 10. P. (silv.)
P. geranioides V; 5 cm.; yellow; Or.; 4, 6.
P. gracilis V; 15 cm.; bright yellow; R. M.; 6.
P. grandiflora VI; 20 cm.; golden yellow; Eur., Si.; 1.
P. Haynaldiana VI; 15 cm.; yellow; N. Am.; 1. (silv.)
P. Hippiana VI; 15 cm.; yellow; N. Am.; 1 (silv.)
P. Kurdica VI; 80 cm.; bright yellow; Or.; 1.
P. multifida V; 25 cm.; yellow; Al.; 1.
P. nepalensis (*formosa*) V-IX; bright rose; H.; 1. (A var. *Willmottiana* with bigger flowers.)
P. nevadensis V; 10 cm.; yellow; Sp.; 1, 4. (silv.)
P. nitida V; 5 cm.; light rose; E. and S. Al.; 4, 6. (silv.) (Vars. *alba, atrorubens,* and *grandiflora.*)
P. nivalis VI; 20 cm.; white; Py.; 1, 4, 6. (silv.)
P. nivea V; 8 cm.; yellow; high mountains of N. Hemisph.; 6, 10.
P. pedemontana VI; 30 cm.; bright yellow; Pied. Al.; 1, 6.
P. peduncularis VII; 20 cm.; yellow; H.; 5, 9.
P. pennsylvanica VI; 40 cm.; yellow; N. Am.; 1.
P. petiolulata VI-VII; 10 cm.; white; W. Al.; 4. L. (silv.)
P. pulvinaris VI; 8 cm.; bright yellow; 6, 9, 10. (silv.)
P. pygmæa (*corsica*) VI; 5 cm.; white; Co.; 4, 6.

P. pyrenaica V; 10 cm.; bright yellow; Py.; 1, 6.
P. rupestris VI-VIII; 50 cm.; white; Eur., Ca., Or.; 1, 4. (A var. *grandiflora.*)
P. sanguisorbæfolia VI; 20 cm.; yellow; S. Eur.; 1.
P. Saxifraga VII; 10 cm.; white; M. Al.; 4. L.
P. speciosa (*poetarum*) VI; 10 cm.; yellowish; Or.; 1, 4 (silv.)
P. subacaulis (*velutina*) VI; 25 cm.; golden yellow; Si.; 1. (silv.)
P. Thurberi VII; 50 cm.; brilliant red; Cal., R. M.; 1.
P. Tonguei VI; 10 cm.; apricot yellow; Ch.; 1.
P. Tormentilla, Tormentil, VII; 10 cm.; yellow; Eur.; 3, 7.
P. tridentata VI; 10 cm.; white; N. Am.; 8. P.
P. uniflora V; 10 cm.; yellow; Arc. reg.; 8.
P. Valderia VI; 20 cm.; yellowish; M. Al.; 6. P. (silv.)
P. verna III; 10 cm.; yellow; Eur.; 1, 4, 7.
P. villosa V; 30 cm.; golden yellow; A. R.; 1, 6.
P. Visiani VI; 20 cm.; bright yellow; Ba.; 1.

Poterium. See Sanguisorba.

Pratia. Dwarf creeping Lobelias from New Zealand or the Himalayas, bearing masses of stemless flowers all the summer through. *P. angulata, arenaria, begoniæfolia, ilicifolia, marodon,* and *perpusilla* are the best known. All should have a sheltered place in a rather moist soil. Division or seed.

Prenanthes *purpurea.* Woodland Composite, 80 cm. high, elegant, a kind of Lettuce with purplish stems and violet-purple flowers, blooming all the summer through in shady, woody places in the European mountains. Underwood or shady rockery. Seed.

Primula. This is indeed a difficult chapter to treat here, as the genus is one of the most precious and most popular with alpine gardeners. It increases as fast as an American town and every year brings us numerous new kinds, especially from Central Asia. The monograph of Pax, published in 1905, is already an old and out-of-date document,[34] and in 1913 Prof. Bayley Balfour of the Edinburgh Botanic Garden proposed important modifications of the Pax classification, numerous new kinds finding no place in it. It was then replaced by Balfour but, since his death, a large number of new Primulas have been imported which again cannot be classified. Prof. W. W. Smith, his successor at Edinburgh, and Mr. G. Forrest, the traveller who brought such a mass of beauties from Central Asia, have lately published a revision of the monograph and a classification of the Primula in thirty-two different sections.[35] This is of course a scientific and botanical classification; but each of these different sections corresponds to a kind of cultural treatment, and therefore we follow here that classification. We only mention those sections which contain some introduced cultivated species of Primula which are to be found not only in the Botanic Garden of Edinburgh but also in gardens. (See color plate facing p. 358.)

I. SECTION *Auricula.* European and alpine in its distribution, extending from the Pyrenees to the Balkan Peninsula, comprising the Apennines and the Carpathians. They are generally rock plants, all but *minima, glutinosa,* and *deorum,* demanding cultural treatment No. 4; some growing in lime, a few of them preferring granite.

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[34] See Pax and Kunth, Primulaceæ, Engler's *Pfl. Reich.* IV, 237, Leipzig, 1915.

[35] W. Smith and G. Forrest, The sect. of Primula in *Notes from the R. Bot. Garden,* Edinburgh, March, 1925. In 1928 Mr. A. W. Darnell published in the *Gard. Chronicle* an important study of the Primula, with their description, origin, and culture, which is the best guide available today.

II. SECTION *Bullatæ.* Asiatic, with rugose leaves and well-developed rhizomes; they are of robust habit. *P. Forresti* is the one really introduced to gardens. It wants a sheltered position on a wall.

III. SECTION *Candelabra.* Asiatic, one of the best known in gardens, the type *P. Japonica* having been grown generally for half a century. It contains 30 species, all Asiatic. They produce a tall scape with numerous whorls of flowers giving the inflorescence the appearance of a candelabra. Their leaves are those of *acaulis.* They like a moist, spongy soil and a cool, half-shady location.

IV. SECTION *Capitatæ.* Asiatic, flowers capitate, pendent; farinose outside and in the calyx; leaves finely dentate. Pure peat, well-drained soil, half shade.

V. SECTION *Cortusoides.* Northeast Asia to Tibet. Leaves lobate, destitute of farina; flowers in loose heads. Culture easy, peat and leaf mould with sand in a well-drained, half-shady place. They can be divided when old.

VI. SECTION *Cuneifolia.* N. E. Asia and the Rocky Mountains. Very distinct section with its characteristic leaves, of good texture, often cuneate in shape, with few but regular teeth recalling some leaves of the Geum Saxifrages. The only species now in cultivation is the rare and curious *P. suffrutescens* of the Rockies, which is half shrubby like *P. marginata* and of difficult cultivation. A fissure on a granitic wall, but better in well-drained pots; peat mixed with leaf mould and coarse sand.

VII. SECTION *Denticulata*. Asiatic, chiefly Himalayan. Flowers generally numerous, sessile or subsessile in dense head and primrose-like leaves. They flower in the early spring. Very easy cultivation: a moist, half-shady situation with rich, light soil.

VIII. SECTION *Dryadifolia*. Central Asiatic. Habit half shrubby, with a massive rhizome, the aspect of a Dryas set with large, round, fragrant blossoms emerging from a bag of dark purple bracts. The type, *P. Dryadifolia,* is of uneasy cultivation and wants a permanent underground watered moraine bed, what we call *tourbière*.

IX. SECTION *Farinosæ*. Europe, N. and Central Asia, N. Am., arctic and antarctic countries. The type, *P. farinosa,* is well known; flowers disposed in capitule or umbel; the stem, sometimes the under side of leaves, are powdered with farina and the leaves are disposed in more or less dense rosettes. Rather easy cultivation: spongy leaf mould, if possible watered from below; a cool, half-sunny place.

X. SECTION *Grandis*. The Caucasus. Contains only its type, which is a large-leaved plant with minute lobular yellowish nodding flowers, a kind of Cabbage, as it were! It likes the bog or a damp, deep soil and can be divided.

XI. SECTION *Malacoides.* Asiatic. Short-lived plants, seeding freely. They are inhabitants of rice-fields and other cultivated areas in China and are of little value for us.

XII. SECTION *Megasæfolia.* Asia Minor. Represented by its type only; not quite hardy with us. Large heart-shaped, leathery, fleshy leaves; flowers in large umbels. Must be planted on a sheltered, well-drained spot in the rockery in pure peat and covered (here at least) through the winter. Can be divided.

XIII. SECTION *Muscarioides.* Asiatic, near to Capitatæ, but the flowers are disposed on spikes with nodding flowers. Not easy to cultivate; they like peat and prefer the *tourbière* or moraine.

XIV. SECTION *Nivales.* Asiatic and American. This is one of the richest and the brightest; but up to now a few only are in cultivation. They are generally stout plants with fleshy roots, large leaves, flowers in a big head; very ornamental. This section offers the best Primulas for mountain gardens and the higher they are the better they do. I cannot succeed with them at Floraire, so I have a tiny little garden at Marchairuz (Jura) 1500 m. altitude, and there they do splendidly. And then we have above Davos a little corner where we grow them for the seeds with the greatest facility. They like moist, acid soil and half shade; plenty of sun if on the mountains.

XV. Section *Obconica.* Asiatic. Lobed, pubescent leaves, without farina; flowers in terminal clusters; they are not hardy with us nor long-lived. They want a good leaf mould and a half-shady situation. (Leaves poisonous to some people.)

XVI. Section *Petiolares.* Central Asiatic. This is a very important group, but none of this apart from *P. Winteri* are introduced. Difficult culture; it flowers through the winter out-of-doors, often when the snows cover the soil. A fresh, cool corner facing north suits it; we have it here on a shady wall.

XVII. Section *Rotundifolia.* The Himalayas and Tibet. It includes only 8 species of which *P. Bayleiana* and *P. cariophylla* only are in cultivation; they can be recognised by the long petioles and the more or less orbicular leaves with cordate base. They are all high alpines, inhabiting countries covered with snow six months long, and do not stand changes of temperature during the winter months. *Tourbière* or moraine.

XVIII. Section *Sikkimensis.* Asiatic. Large plants with coarse leaves and bell-shaped flowers disposed in loose clusters. Easy culture; moist, porous, or rich, deep soil, half shade. Much better in the mountain gardens than on the plains. Can be divided.

XIX. Section *Soldanelloides.* Asiatic. Near to Muscarioides, but the form of the corolla, a pendent bell in a bell-shaped calyx, is different. All are high alpines with a six-month winter. *Tourbière* or moraine.

XX. Section *vernales*. Chiefly European, extending also into Western and N. Asia. It comprises the Common Primroses, Oxlip, and Cowslip, and is of the easiest cultivation. Very suitable for the Swiss meadow, the underwood, or the border as well as for the rock garden. Can be divided.

XXI. Section *Verticillata*. West Himalayas, Arabia, Abyssinia, and Sinai. Distinct by the membranous leaves, superposed verticils of flowers, and the leafy bracts; rather greenhouse plants.

All these twenty-one sections offer us plants that are being grown in gardens and we omit other sections which have no representatives in cultivation. All the Primula grown in the rockery are referred to these 21 sections, as indicated by the Roman ciphers given here for classification. All the Primula are grown from seed; many of them, especially the section Auricula, are slow germinating, particularly if the seeds are old. They retain their germination power for ten to twelve years, but after two years take a long time to sprout.

P. acaulis (*vulgaris* or *grandiflora*) II-IV; 10 cm.; lemon yellow; Eur.; 1. Sect. XX. (Numerous vars. of all colours and shades.)

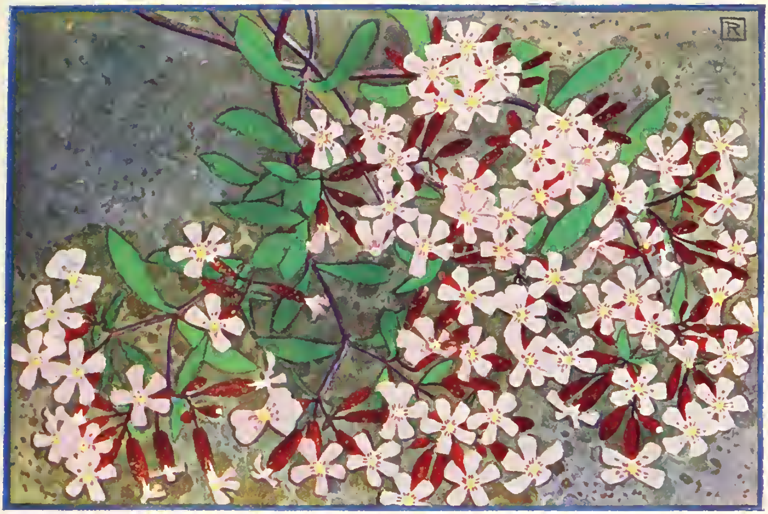
P. æmula VI; 40 cm.; bright yellow; Y.; 9, 10; Sect. XIV.

P. algida IV; 10 cm.; rose violet; Ca., Si.; 1, 3, 9; Sect. IX.

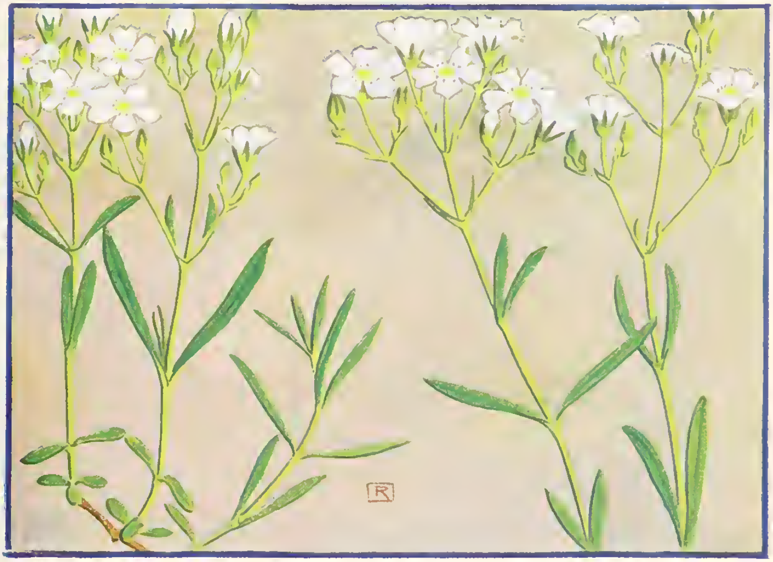
P. Allionii III-IV; 5 cm.; carmine; M. Al.; 4; Sect. I. L.

P. alsophila VI; 10 cm.; mauve; Tibet; 8; Sect. V.

P. amœna III-IV; 10 cm.; rose lilac; Ca.; 1; Sect. XX.



Saponaria ocymoides



Gypsophila repens

P. angustifolia V; 15 cm.; lilac rose; R. M.; 8, 9; Sect. XIV.

P. apennina IV; 15 cm.; bright carmine; Ap.; 4; Sect. I.

P. aurantiaca V; 20 cm.; bright orange; Ch.; 8, 9; Sect. III.

P. Auricula III-VI; 10 cm.; golden yellow; Ap., Al., Cp.; 1, 4; Sect. I. L. (This plant with its numerous varieties, crossed with *hirsuta,* gave the garden *Auricula.*)

P. auriculata V; 25 cm.; violet; Ca., Or.; 8; Sect. IX.

P. balearica III; 10 cm.; white; Balearic Islands; 1; Sect. XX.

P. Bayleyiana III; 10 cm.; violet blue; Tibet; 9, 10; Sect. XVII.

P. Beesiana V-VIII; 30 cm.; carmine rose; Ch.; 1, 3; Sect. III.

P. bellidifolia V; 15 cm.; lilac violet; H.; 9; Sect. XIII.

P. borealis III; 5 cm.; rose; Arc. R.; 9; Sect. IX.

P. Boveana VI; 15 cm.; yellow; Sinai; 6; Sect. XXI.*

P. Bulleyana V-VIII; 30 cm.; bright orange; Ch.; 1, 3; Sect. III.

P. capitata VII-IX; 20 cm.; deep blue; H.; 8, 9; Sect. IV.

P. capitellata V; 15 cm.; rose lilac; Or.; 6, 9; Sect. IX.

P. carniolica III-V; 8 cm.; lilac purple; E. Al.; 4, 5, 6; Sect. I.

P. cashmiriana II-IV; 50 cm.; light lilac; H.; 1, 3; Sect. VII.

P. cernua V; 10 cm.; clear blue; Y.; 10; Sect. XIII.

P. chionantha VI; 30 cm.; cream white; Ch.; 3, 6, 8; Sect. XI.

P. chrysopa VI; 15 cm.; lilac blue; Ch.; 6, 9; Sect. IX.

P. ciliata IV; 6 cm.; yellow; E. Al.; 4, 6; L.; Sect. I.

P. Clusiana III-IV; 8 cm.; carmine lilac; E. Al.; 4, 6; Sect. I.

P. Cockburniana V-VII; 20 cm.; bright vermillion; Ch.; 6, 9; Sect. III.

P. commutata III; 5 cm.; deep violet; E. Al.; 4, 6; Sect. I.

P. concina IV; 10 cm.; pink; H.; 10; Sect. IX.

P. conica V; 20 cm.; lavender purple; Ch.; 8; Sect. XIII.

P. conspersa IV; 15 cm.; bright pink; Ch.; 9; Sect. IX.

P. Cooperi V; 25 cm.; blue; Ch.; 9; Sect. III.

P. cortusoides IV; 20 cm.; bright rose; H., Si.; 1; Sect. V.

P. Cottia III-V; 8 cm.; bright carmine; Ped. Al.; 4, 6; Sect. I. P.

P. crenata; a deep crenate form of *marginata.*

P. crispa IV; 15 cm.; lilac blue; Ch.; 8; Sect. VII.

P. Cusickiana V; 15 cm.; pale violet; R. M.; 5, 9; Sect. XIV.

P. darialica IV; 8 cm.; flesh rose; Ca.; 3, 9; Sect. IX.

P. deflexa V; 10 cm.; periwinkle blue; Ch.; 8, 9; Sect. XIII.

P. denticulata II-IV; 30 cm.; lilac; H.; 1, 3; Sect. VII.

P. deorum V; 15 cm.; violet; Ba.; 6, 9; Sect. I.

P. dryadifolia V; 10 cm.; rose pink; Y.; 9, 10; Sect. VIII.

P. elatior, Oxlip, III-V; 20 cm.; pale yellow; Eur.; 1, 7; Sect. XX. (Numerous garden vars. and hybrids (*P. veris*).)

P. erosa IV; 15 cm.; lilac; H.; 1, 3; Sect. VII.

P. erythrocarpa IV; 20 cm.; violet blue; Ch.; 8; Sect. VII.

P. Facchini; natural hybrid, *minima* x *spectabilis.*

P. farinosa III-V; 10 cm.; rose; Eur., Sc., A. R.; 1, 3; Sect. IX. (Vars. *alba, borealis, dahurica, grandiflora, grœlandica, Hornemanniana, magellanica, modesta,* etc.)

P. fasciculata IV; 10 cm.; pink lilac; Ch.; 3, 9; Sect. IX.

P. Flœrkeana; natural hybrid, *glutinosa* x *minima.*

P. floribunda I-III; 30 cm.; golden yellow; H.; 6; Sect. XXI.*

P. Florindæ V; 20 cm.; yellow; Ch.; 5, 8; Sect. XVIII.

P. Forbesi V-IX; 15 cm.; bright pink; Ch.; 5, 6; Sect. XI. (Some garden varieties.)

P. Forresti V; 20 cm.; bright yellow; Y.; 5, 9; Sect. II.*

P. frondosa III-V; 20 cm.; pink; Ba.; 1, 3; Sect. IX.

P. geraniifolia V; 15 cm.; rose; H.; 5, 6, 9; Sect. V.

P. Giraldiana IV; 30 cm.; lilac blue; Y.; 3, 8; Sect. XIII.

P. glabra IV; 10 cm.; lilac; H.; 5, 6; Sect. IX.

P. glacialis V; 10 cm.; rose; Ch.; 9; Sect. XIV.

P. glaucescens (*calycina*) III; 10 cm.; carmine; It. Al.; 4; Sect. I.

P. glutinosa V; 8 cm.; dark violet; E. Al.; 9, 10; Sect. I.

P. glycyosma VI; 30 cm.; rose; Y.; 10; Sect. III.

P. grandis VI; 50 cm.; pale yellow; Ca.; 1, 3; Sect. X.

P. hapala V; 25 cm.; carmine; Ch.; 1, 6; Sect. V.

P. helodoxa V; 60 cm.; rich yellow; Ch.; 1, 6; Sect. III.

P. heterochroma IV; 10 cm.; white; Persia; 1; Sect. XX.

P. heucherifolia V; 20 cm.; carmine; Ch.; 1, 6; Sect. V.

P. hirsuta (*viscosa,* Vill.) III; 5 cm.; bright carmine; Al.; 4, 9; Sect. I. P. (Numerous natural hybrids (see below) and garden vars.)

P. Hookeri V; 2 cm.; white; Sikkim; 10; Sect. XVI.

P. imperialis VII; 80 cm.; yellow; Java; 5, 9; Sect. III.*

P. integrifolia (*candolleana*) IV; 5 cm.; violet; Al., Py.; 6, 8; Sect. I.

P. intricata III; 15 cm.; yellow; Py.; 1, 7; Sect. XX.

P. involucrata (*Munroi*) VI; 15 cm.; opaline white; H.; 1, 5, 6; Sect. IX.

P. japonica V-IX; 25 cm.; scarlet or carmine; Jap.; 1, 3; Sect. III. (Numerous forms and garden vars.)

P. Juliæ VI; 15 cm.; bright carmine; Ca.; 1, 5; Sect. XX.

P. Kaufmanniana V; 10 cm.; rose; Tu.; 3, 9; Sect. V.

P. Kitaibeliana IV; 10 cm.; violet purple; E. Al., Ba.; 4, 6; Sect. I.

P. Knuttiana V; 20 cm.; lilac rose; Ch.; 3, 8, 9; Sect. IX.

P. latifolia, graveolens. See *viscosa.*

P. leucophylla IV; 15 cm.; yellow; E. Eur.; 1; Sect. XX.

P. limnoica IV; 20 cm.; lilac; Ch.; 6; Sect. VII.

P. lishiangensis VI; 20 cm.; violet lilac; Ch.; 5, 6, 9; Sect. V.

P. Listeri VIII; 25 cm.; light lilac; Ch.; 6, 9; Sect. XV.*

P. Littoniana VI; 40 cm.; red, lilac, and violet; Y.; 5, 6, 9; Sect. XIII. P.

P. longiflora IV; 10 cm.; flesh rose; S. E. Al.; 3, 6, 9; Sect. IX.

P. luteola V; 30 cm.; deep yellow; Ca.; 3, 6, 9; Sect. IX.

P. macrocalyx IV; 10 cm.; light yellow; Si.; 1; Sect. XX.

P. malacoides I-IV; 30 cm.; rose; Ch.; greenhouse; Sect. XI.

P. marginata III-V; 20 cm.; light blue violet; E. and S. Al.: 4, 6; Sect. I.

P. Maximoviczii IV; 25 cm.; bright red; Ch.; 5, 9; Sect. XIV.

P. membranifolia V; 5 cm.; rose violet; Y.; 10 cm.; Sect. IX.

P. microdonta alpicola V; 60 cm.; yellow; Ch.; 9; Sect. XVIII.

P. minguida IV; 10 cm.; bright violet; Ch.; 9; Sect. XIV.

P. minima III-IV; 5 cm.; violet carmine; Al., Cp., Ba.; 6, 9; Sect. I.

P. mistanissica IV; 8 cm.; rose; Bor. Am.; 3, 9; Sect. IX.

P. Miyabeana V; 25 cm.; rich purple; Formosa; 9, 10; Sect. III.

P. modesta IV; 8 cm.; lilac rose; Jap.; 6, 9; Sect. IX.

P. mollis VI-VII; 20 cm.; bright carmine; H.; 3, 6, 9; Sect. V.

P. Morreana VII-IX; 15 cm.; deep blue; Ch.; 6, 8, 9; Sect. IV.

P. Murettiana; natural hybrid, *integrifolia* x *hirsuta;* 4. P.

P. muscarioides VI; 20 cm.; deep blue; Ch.; 5, 9; Sect. XIII.

P. nivalis V; 30 cm.; violet to light blue; Ch.; 5, 6, 9; Sect. XIV. (Very variable and heteromorphus; numerous vars.)

P. nivea is *hirsuta alba.*

P. nutans IV; 20 cm.; lavender blue; Y.; 9; Sect. XIII.

P. obconica; a greenhouse plant flowering all the year round.

P. obliqua V; 25 cm.; white; Sikkim; 9; Sect. XIV.

P. Œnensis (*daonensis*) III; 8 cm.; bright carmine; E. Al.; 4, 6; Sect. I.

P. officinalis III-V; 15 cm.; yellow or orange; Eur., N. Asia; 1, 7; Sect. XX. (Numerous vars., hybrids and garden forms.)

P. Olgæ IV; 15 cm.; lilac violet; Tu.; 3, 5, 6; Sect. IX.

P. Palinuri V; 40 cm.; rich yellow; Cape Palinuro (It.); 4, 6; Sect. I.*

P. pannonica III; 15 cm.; yellow; E. Eur.; 1; Sect. XX.

P. Parryi V; 15 cm.; bright carmine; R. M.; 5, 6; Sect. XIV.

P. patens (*Sieboldi* vars.) IV; 15 cm.; bright carmine; Ch.; 1, 5; Sect. V.

P. Pauliana V; 20 cm.; yellow; Ch.; 6; Sect. V.

P. pedemontana IV-V; 10 cm.; bright carmine; Ped. Al.; 4; Sect. I.

P. petiolaris IV; 15 cm.; light rose; Sikkim; 9; Sect. XVI.

P. pinnatifida VI; 15 cm.; lavender blue; Ch.; 9; Sect. XIII.

P. Poissoni VII; 30 cm.; bright carmine; Y.; 3, 6; Sect. III.

P. prolifera VII; 35 cm.; golden yellow; Ch.; 3, 6, 8; Sect. III.

P. pseudo-capitata VIII; 15 cm.; deep blue; Ch.; 8, 9; Sect. IV.

P. pseudo-denticulata IV; 25 cm.; lilac; Y.; 1', 6; Sect. VII.

P. pseudo-Sikkimensis VII; 20 cm.; yellow; H.; 6, 8; Sect. XVIII.

P. pubescens; a natural hybrid, *auricula* x *hirsuta;* 4.

P. pulchella VI; 20 cm.; lavender blue and yellow; Y.; 8, 9, 10; Sect. XIV.

P. pulchelloides VII; 20 cm.; light blue; Y.; 8, 9, 10; Sect. XIV.

P. pulverulenta VI-VII; 30 cm.; bright carmine; Ch.; 1, 3, 6; Sect. III.

P. Purdomi III; 20 cm.; light blue; Tibet; 9, 10; Sect. XIV.

P. purpurea V; 50 cm.; dark violet; H.; 5, 9; Sect. XIV.

P. reflexa VI; 30 cm.; clear purple; H.; 6, 8; Sect. XIV.

P. reticulata VI; 30 cm.; yellow; H.; 3, 5, 9; Sect. XVIII.

P. rosea II-V; 10 cm.; bright rose; H.; 3, 6, 8; Sect. IX. (Vars. *grandiflora, elegans,* and *splendens.*)

P. Rusbyi VI; 15 cm.; rose red; Arizona; 4, 6, 8; Sect. XIV.

P. Sapphirina IV; 20 cm.; violet blue; H.; 5, 9; Sect. XIX.

P. saxatilis; a violet rose *patens.*

P. scotica; a dwarf and minute Scottish *farinosa.*

P. seclusa VII; 20 cm.; bright pink; Ch.; 6, 8; Sect. V.

P. secundiflora VII; 25 cm.; rich purple magenta; Ch.; 6, 8; Sect. XVIII.

P. septemloba V; 25 cm.; violet pink; Y.; 6, 8; Sect. V.

P. serratifolia VII; 20 cm.; bright orange; Ch.; 6, 8; Sect. III.

P. Siamensis V; 10 cm.; lilac; North Siam; 8, 9; Sect. XIX.

P. sibirica IV; 15 cm.; opaline white; Si.; 5, 9; Sect. IX.

P. Sieboldi V-VI; 20 cm.; bright carmine; Jap.; 5, 8; Sect. V. (Numerous garden vars.)

P. Siebthorpii II-IV; 10 cm.; lilac rose; Ba., Ca.; 1; Sect. XX.

P. Sikkimensis V-VII; 25 cm.; light yellow; H.; 1, 3, 6; Sect. XVIII.

P. sino-purpurea V; 15 cm.; violet; Ch.; 6, 9; Sect. XIV. (Many vars. and forms.)

P. Smithiana VI; 30 cm.; yellow; Ch.; 6, 8; Sect. III.

P. soldanelloides III; 5 cm.; snow white; Sikkim; 8, 9, 10; Sect. XIX.

P. spectabilis III-IV; 5 cm.; purple carmine; E. Al.; 4, 6; Sect. I.

P. sphærocephala VII; 20 cm.; deep blue; H.; 8, 9; Sect. IV.

P. spicata V; 8 cm.; china blue; Y.; 9, 10; Sect. XIX.

P. stenocalyx IV; 5 cm.; bluish rose; Tibet; 8, 10; Sect. IX.

P. stricta; an arctic dwarf *farinosa.*

P. Stuartii V; 20 cm.; bright yellow; H.; 5, 9; Sect. XIV.

P. suffrutescens V; 15 cm.; carmine; R. M.; 5, 9; Sect. VI.

P. tibetica V; 5 cm.; rose pink; Tibet; 5, 9; Sect. IX.

P. tyrolensis IV; 8 cm.; carmine; E. Al.; 4, 5; Sect. I.

P. umbretia V; 8 cm.; lavender blue; Ch.; 6; Sect. IX.

P. uniflora V; 15 cm.; lilac blue; Sikkim; 9, 10; Sect. XIX.

P. variabilis (*veris*). Under this name are the Garden Primroses, hybrids from *acaulis, elatior,* and *officinalis;* they are of many colours and shades, from indigo blue to pure white, with single and double flowers, some of them being very brilliant and showy. A nice, curious, and old form is the "Hose-in-Hose," bearing two corollas—the one inserted in the other.

P. Veitchii IV-V; 15 cm.; bright carmine; Ch.; 6, 8; Sect. V.

P. venusta, natural hybrid, *carniolica* x *Auricula.*

P. veris. See *variabilis.*

P. verticillata III; 15 cm.; bright yellow; Arabia; greenhouse; Sect. XXI.

P. villosa IV; 8 cm.; bright carmine; E. Al.; 4, 6; Sect. I.

P. viscosa (*graveolens*) IV; 10 cm.; purple; W. Al., Py.; 4, 6; Sect. I.

P. Vittata VIII; 30 cm.; dark pink or purple; Y.; 6, 8; Sect. XVIII.

P. Waltoni VI; 12 cm.; port-wine red; Tibet; 8; Sect. XVIII.

P. Wardii; an *involucrata major.*

P. Wilsoni (*angustidens*) V; 25 cm.; magenta; Y.; 8; Sect. III.

P. Winteri I-II; 20 cm.; light mauve; Ch.; 4, 9, 10; Sect. XVI.

P. Wulfeniana IV; 5 cm.; bright carmine; E. Al.; 4, 6; Sect. I.

There are numerous hybrids, natural or horticultural, which we cannot describe here and which can be found mentioned in the gardening papers. Some of the most important of the natural ones which can be had in collections follow:

Sect. I.—*P. admontensis* (*Clusiana* x *Auricula*); *Arctotis* (*Auricula* x *hirsuta*); *Berninæ* (*hirsuta* x *viscosa*); *biflora* (*glutinosa* x *minima*); *Brennya* (*hirsuta* x *minima*); *coronata* (*minima* x *Œnensis*); *discolor* (*Auricula* x *Œnensis*); *Dygnana* (*integrifolia* x *viscosa*); *Escheri* (*Auricula* x *integrifolia*); *fratensis* (*minima* x *spectabilis*); *Gœbelii* (*Auricula* x *hirsuta*); *Juridella* (*minima* x *tyrolensis*); *Heerii* (*hirsuta* x *integrifolia*); *Obovata* (*ciliata* x *tyroliensis*); *Peyrischii* (*Auricula* x *hirsuta*); *Portenschlagiana* (*Clusiana* x *minima*); *Salisburgensis* (*glutinosa* x *minima*); *Sendtneri* (*Auricula* x *pedemontana*); *Sturyi* (*minima* x *villosa*); *Venzoyi* (*tyroliensis* x *Wulfeniana*); *Widmeræ* (*minima* x *Œnensis*).[36]

Sect. III.—Some remarkable garden hybrids. *Annesgrove Hybrids, Bullasii, Bulleyana* x *Beesiana, Bulleyana* x *Japonica, Florariensis* (*Bulleyana* x *japonica*), *Lyssadell* (*Cockburniana* x *Bulleyana*); *Red Hugh,* etc.

Sect. XX.—The natural and artificial hybrids are especially numerous here and the varieties still more (see *P. variabilis*). *P. Juliæ* of recent introduction seems especially disposed to cross. We found in a part of our garden, very far from the bed of *P. Juliæ,* a cross of it with *P. elatior* we called *Theodora. P. Helenæa,* the same cross, came into the trade two years after. The best of all is the marvellous *P. Wanda* with large, bright magenta flowers, an exaggeration of *P. Juliæ;* it is a cross, *Juliæ* x *acaulis* var. *rubra.*[37]

PRIVA *lævis.* A little Verbena 40-50 cm. high, with reddish flowers which must have a sheltered place in the rockery. South Andes.

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[36] See for more descriptions on the varieties and hybrids: John MacWatt, *The Primulas of Europe,* London, 1923.

[37] See J. de Vilmorin, *On Hybrids of P. Juliæ, Bull. Soc. Bot.,* France, 1922, T, XXII.

PRUNELLA. Self-heal. Low and creeping Labiate with dense spikes of flowers blue, violet, purple, white, or carmine which are good for carpeting purpose, in the rockery or on the paved walk. The best are *P. grandiflora* with its carmine variety *rubra; P. laciniata* and its vars. *alba, pyrenaica, Webbiana.* A sunny place and light soil. Division or seed.

PSILOSTEMON. See BORAGO.

PTARMICA. See ACHILLEA.

PTEROCEPHALUS (Scabiosa) *Parnassi.* A dense and dwarf Scabious of Grecian origin, carpeting the rocks with its grey foliage and numerous large heads of pinky-lilac flowers which appear during the summer months. *P. Pinardi,* of the mountains of Asia Minor, has larger heads of rose flowers. Both want full sun and the rockery or a wall fissure. Division, cuttings, or seed.

PTILOTRICHUM. See ALYSSUM.

PULMONARIA. Lungwort. These Borageworts are common in our European woods and may be regarded as the Old World Mertensia. Their leaves are roughly covered with hairs and often maculated; the flowers are presented in heads of blue, azure, pinky blue, red, very seldom whitish. Division or seed.

P. angustifolia (*azurea*) III-IV; 25 cm.; azure blue and pink; Eur., Si.; 1.

P. arvernensis; taller and has more pinkish flowers.

P. mollis (*montana*) IV; 20 cm.; carmine and indigo; Eur., Si.; 1.

P. officinalis III-V; 25 cm.; rose and blue; Eur.; 1, 2.

P. rubra IV; 20 cm.; crimson; Tr.; 1, 2.
P. tuberosa IV; 20 cm.; reddish violet; Eur.; 1.

PULSATILLA. See ANEMONE *Pulsatilla.*

PUSCHKINIA. Gracious Oriental Liliad near to Scilla and grown like it. *P. Libanotica,* 10 cm. high with blue flowers; *P. striata* with white; and *P. scilloides,* 10 cm., with azure and white.

PUTORIA *calabrica.* A dwarf and dense shrub from South Europe, belonging to the Rubiaceæ and growing in the Mediterranean regions; it has tender rose flowers in a head followed by red berries and wants a sheltered and dry place. Cuttings, division, or seed.

PYRETHRUM. A large genus, near to Chrysanthemum, offering some good bushy and dense plants for the sunny parts of the rock garden. *P. roseum* is well known for its large Marguerite-like flowers, single or double, pink, crimson, rose, or white, which are one of the glories of the hardy border. There are, however, some less known species, very important for the rockery: *P. argenteum* (25 cm. high) with silver-white foliage and yellow Daisy-like flowers, and *P. densum* (20 cm.) dwarfer and with more deeply cut leaves, dwarf shrubs coming from Armenia, the Taurus, etc.; and both are suitable for hot, dry, and sunny places. Propagation from cuttings. For *P. Tschihatcheffi* see Chamæmelon.

PYROLA. Wintergreen. Including Chimaphila and Moneses. These form one of the most delicate and interesting features of the underwoods all over the Northern Hemisphere. Nothing is more striking than the large tufts of *P. rotundifolia* with their pink Lily-of-the-Valley flowers, or those of *P. umbellata* flourishing under the darkest woods; and nothing can describe the sweetness of the pure white wax flower of the *P.* (*Monotropa*) *uniflora* with its delicate and aristocratic perfume, growing under the trees of the mountain regions; it is often called *Moneses grandiflora.* "This delicate loveliness," says Farrer, "is terribly hard to collect, and when got by no means easy to grow. In nine cases out of ten, it will be found running underground with thread as fine as cotton, never arriving at any root at all and quite useless to collect." We, here at Floraire, transplant it in October under our Swiss Pine (*Pinus Cembra*) in a needle-rich, mossy soil and it goes on for three to four years, never more. In England I have seen well acclimatised patches, especially those of that best "acclimateur" of difficult plants, Mr. St.-Quintin, in East Yorkshire.

All the Pyrolas can be transplanted and established, but especially those of the rotundifolia group (*P. americana, arenaria, asarifolia, chlorantha, elliptica, media, rotundifolia, uliginosa*—with pink flowers). They form in the mountain woods of Europe, Asia, and North America large patches of shining bright green foliage and grow generally in leaf mould. Such conditions may be offered them in our gardens. *P. secunda,* the commonest of all, of less beauty I must say, is the most difficult of all, at least in our Continental climate; but I have seen some well-acclimatised colonies in England. The Chimaphila group: *P. umbellata,* a very rare European which I found in its full luxuriance in the woods of Massachusetts forming large carpets of dark green shining and dentate foliage and again on the Rockies, where it grows till 25 cm. high; and *P. maculata,* a beauty with dark green leaves mottled with white along the veins, an American one too which I found once in Fontainebleau Forest (how it came there nobody knows), are relatively easier. We grow them in peaty pans, on a shaded bed. After a severe drought, however, we lose them. In the Western parts of North America the coniferous woods shelter a rich lot of Pyrola, unknown elsewhere. In his *Flora of the West Coast* Piper describes eight different genera (*Allotropa, Chimaphila, Hypopitys, Moneses, Newberrya, Pityopus, Pleuricospora,* and *Pyrola*), including twenty different Pyrola, some of them being rare beauties. I saw in the splendid Redwood forests of California such marvels as *P. incarnata* with pink flowers, *P. picta* with white-veined elliptic leaves, and our common *P. secunda.* What a pity these delicate children of the woods are of such uneasy culture!

PYXIDANTHERA *barbulata.* A minute shrubby polemoniaceous plant resembling *Azalea procumbens,* never exceeding 3 or 4 cm. high, with pale pink flowers, like those of *Androsace glacialis;* IV-V;

Bor. regions; 8, 9, 10. Cuttings, seed, or division.

RAILLARDELLA *argentea, Muirii, Pringlei, scabrida,* and *scapora* are Californian or Rocky Mountain low Composites with yellow flowers in heads, which do well on the hot, sunny places of the rockery. Some look as though they were yellow Scabious. Division or seed.

RAMONDIA. Here we have one of the most curious genera of mountain plants. Up to the year 1878 *Ramondia pyrenaica* was a monotype of a monogenus—hardly did the botanist know to what family it really belonged. Now it is put into the Gesneraceæ according to *Index Kewensis,* and into Cyrtandræ by the French botanists. *R. pyrenaica* covers the damp and shady walls and slopes of the Pyrenees on both sides—French and Spanish. It is very abundant there, and its large rosettes of hairy dull-green leaves, shaggy and crinkled, are covered underneath by long brown hairs; its lilac-blue Potato flowers, three or four on a stem of 8-10 cm., springing all round the crown, with 5 lobes to the corolla and orange and gold centre, are one of the features of the Range. It has been grown in gardens for two centuries, and there are some vars. (*alba, rosea, quercifolia,* and *peregrina*). Then in 1878, Dr. Pancic, of Belgrade, found above Nisch (Balkans) on the Suha Planina (1500 m. altitude) a Ramondia with shorter and smaller leaves of a brilliant green with a dense fringe of dark hairs forming a denser rosette, with brighter blue-lilac flowers, generally 4-petaled. He named it *R. Nathaliæ* after the Queen of Serbia, whose physician he was. Then, the year after, he found under the septentrional summit of the same mountain, between 250-1500 m. alt., in the dark and damp gorges never penetrated by the sun's rays, another Ramondia, which he named *R. serbica;* here the flowers are saucer-shaped, flat, lavender-coloured, smaller, with a shorter style, 5-lobed; the leaves are less crinkled and shaggy, but strongly nerved. There is a natural hybrid, *Nathaliæ* x *serbica,* called *R. permixta,* which I never had. The three species are grown here easily on some damp, shady, perfectly perpendicular walls. In the Botanic Garden at Berne I saw some splendid specimens of *R. pyrenaica* growing under deciduous trees (Oaks, I believe) in a flat position. But there the atmosphere is very damp, the garden being located on the strand of the Aar. All the Ramondias can be increased from the leaves, cut and laid on the soil (same proceeding as with Begonia Rex), but the best means of propagation is from seed.

Ranunculus. Buttercup. This is a large genus, very heterogeneous indeed; some are aquatic, some bog plants, others are awful weeds invading fields and meadows; but there are exquisite beauties on the mountains, some with pale pink, deep rose, pure white, others with yellow flowers, worth our respect and best care. Seed (slow germ.) ; sometimes division, but with care.

R. acetosellæfolius V; 10 cm.; white; R. M.; 10.

R. aconitifolius V; 60 cm.; pure white; Eur.; 1, 3. (There is a var. *fl. pl.*)

R. alpestris IV; 10 cm.; pure white; Eur.; 4, 8, 9. L.

R. amplexicaulis IV; 25 cm.; pure white; W. Al., Py., Sp.; 1, 6.

R. (*Callianthemum*) *anemonoides* V; 15 cm.; light rose; E. Al.; 7.

R. angustifolius IV; 15 cm.; white; Py.; 6.

R. arizonicus V; 20 cm.; golden yellow; R. M.; 1.

R. asiaticus V; 20 cm.; scarlet; Or.; 1', 6.*

R. bilobus IV; 10 cm.; pure white; E. Al., Ap.; 6. L.

R. Buchanani VI; 30 cm.; white; N. Z.; 6.*

R. bullatus IV; 20 cm.; yellow; Co.; 1, 6.

R. calandrinioides II; 15 cm.; flesh rose; At.; 6.

R. carinthiacus, carpathicus, and *caucasicus;* three local forms of *montanus.*

R. Chamissonis IV; 10 cm.; light pink; E. Si.; 10.

R. cortusæfolia VII; 60 cm.; yellow; Canaries; 1.*

R. crenatus IV; 8 cm.; pure white; E. Al., Tr.; 6, 10.

R. creticus V; 30 cm.; yellow; Gr.; 1, 6.

R. demissus V; 5 cm.; bright yellow; Gr., Or.; 6.

R. Ficaria. See *Ficaria.*

R. (*Oxygraphis*) *glacialis* III; 8 cm.; light rose and copper; High Al., A. R.; 9, 10.

R. gramineus IV; 20 cm.; bright yellow; S. Eur.; 1, 6.

R. hybridus (*Phtora*) V; 5 cm.; yellow; S. Eur.; 6.

R. Illyricus V-IX; 40 cm.; bright yellow; E. Eur., Ca., Or.; 1.

R. lanuginosus VI; 60 cm.; yellow; Eur.; 1, 2.

R. Lingua VI-IX; 60 cm.; golden yellow; Eur.; 3. (Aquatic.)

R. Lyallii VI; 1 m.; pure white; N. Z.; 9. (Uneasy.)

R. macrophyllus VI; 30 cm.; yellow; Ca.; 1.

R. Majellensis V; 8 cm.; white; Ab.; 8, 9, 10.

R. millæfoliatus VI; 10 cm.; bright yellow; Eur.; 1.

R. monspeliacus VI; 10 cm.; bright yellow; S. Eur.; 1'.

R. montanus VI; 10 cm.; bright yellow; Eur.; 1.

R. nivalis IV; 8 cm.; yellow; A. R.; 9, 10.

R. nivicola VI; 20 cm.; yellow; N. Z.; 6.
R. nyssanus VI; 30 cm.; yellow; Eur.; 1, 6.
R. parnassifolius IV-V; 8 cm.; pure white; Eur.; 4, 6.
R. platanifolius; near to *aconitifolius.*
R. pygmæus V; 3 cm.; yellow; E. Al., B. R.; 8, 9, 10.
R. pyrenæus IV; 10 cm.; white; Eur., A. R.; 6, 9, 10.
R. rupestris VI; 10 cm.; yellow; R. M.; 8, 10.
R. (Callianthemum) rutæfolius IV; 10 cm.; white; Eur., A. R.; 1, 6.
R. Seguieri IV; 8 cm.; pure white; S. Eur. and W. Al.; 6, 9.
R. Sommieri VI; 10 cm.; yellow; Ca.; 1, 6.
R. Thora V; 15 cm.; yellow; Eur.; 1. L.
R. Traunfellneri IV; 8 cm.; pure white; E. Al.; 6, 8.
R. uniflorus IV; 15 cm.; whitish yellow; N. Eur.; 6.
R. Villarsii V; 10 cm.; yellow; Eur.; 1.

RAOULIA. Mat Plant. Cushion Plant. Sheep Plant. New Zealand Composites of very dwarf and minute character which are described in a note of the Trans. New Zeal. Institute.[38] The Cushion plants are one of the curiosities of New Zealand, some forming dense round cushions giving the impression of sheep at rest, with their silver-white masses sometimes older than big trees. They have the cupressoid forms of Helichrysum[39] growing in meagre soil of stony substratum, rapidly drying out and watered from below (desert conditions aboveground but plentiful supply water below). They are formed of an infinity of little rosettes like those of *Androsace Helvetica* or *imbricata* and are sometimes very large. Some cover areas of three square metres, and even more in the case of *R. tenuicaulis,* which is of rapid growth. *R. australis* comes next as a rapid grower. Other Raoulia grown in our gardens are *Buchanani eximia, glabra, grandiflora, Haastii, Hectori, mammilaris, Munroi, rubra,* and *subsericea.* The flowers are minute, unshowy, like those of Helichrysum but filled with whitish radiating bracts. They like warm soil, sand, or moraine and full sun. Division or seed.

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[38] Foweracker, *Trans. N. Zeal. Inst.*, June, 1917; see also *Gard. Chron.*, 24 Nov., 1917, p. 210.

[39] See Cockaine, *The Vegetation of New Zealand,* Leipzig and New York, 1921.

REHMANNIA *angulata* (*elata*), *chinensis* (*glutinosa*), *Henryi,* and *Kewensis.* Chinese plants near to *Digitalis purpurea* belonging in the Scrophularinæ but rather suggesting the Gesneraceæ. They look tender but are pretty hardy here, and only want a sheltered, well-drained corner in rich, light soil. They have light carmine, pink, or clear rose, large bellflowers, marked with yellow and disposed in spikes on 10-25 cm. high leafy stems. Prop. from seed.

REINECKIA *carnea.* A dwarf and cæspitose Japanese Liliad forming tufts of grassy foliage with small violet flowers on stemless spikes, close to the ground, all the summer through; half or full shade. Division.

RESEDA. Wild Mignonette. In Spain and on the Pyrenees you may see all along the railway lines dense tufts of bluish-green plants with numerous whitish flowers in elegant spikes 10-20 cm. high; it is *Reseda glauca,* a modest little plant which finds its place on the barren slopes of rockeries, flowering there all through the summer. Its Spanish cousin *R. complicata* is a semi-shrub 50 cm. high. Seed and division.

RHAMNUS *alpina* and *saxatilis.* Mountain shrubs which may find a place in big rockeries; the last is spiny and dense. *R. pumila,* 5-8 cm. high, is the best creeping shrub; it haunts the limestone sunny walls of the Alps, carpeting them with its dwarf, running branches and is good for paved walks and wall gardens. Seed or cuttings.

RHAPONTICUM *scariosum* (*Centaurea Rhaponticum*). A big Composite growing on the limestone cliffs of the Alps, often reaching 1 m. high, and bearing large heads of pink flowers surrounded by very scariose involucres. Seed.

RHAZIA *orientalis.* Of Greece; a kind of Periwinkle forming loose tufts of glaucous foliage, 60 cm. high, with very nice violet flowers (VI-IX). Good soil, sunny situation. Seed or division.

RHEUM. Rhubarb. Well-known big-leaved plants with ornamental leaves and architectural proportions. *R. officinale, palmatum,* and *Tanguticum* have elegant deeply cut foliage and high (1-2 m.) reddish flower stems. They want space and deep soil. Seed.

RHEXIA *virginica.* From the pine barrens and swamps of the Southern United States; it is about 30 cm. high with opposite egg-shaped leaves and small pink flowers in thick spikes. I saw it exceedingly good in acid soil in some gardens of New

England, but we have great difficulty with it, even in the moraine or in the peat bed. Seed.

RHIZOBOTRYA (*Kernera*) *alpina*. A dwarf Crucifer, 5 cm. high, with numerous little white flowers (IV) which grows in the high rocks of Southern Tyrol and wants to be planted in the northern fissures of a wall or a stone. Seed.

RHODIOLA (*Sedum*) *rosea*. From the circumpolar zones to Japan, New Mexico, the Alps, the Pyrenees, etc., an orpine of special growth with very thick and fleshy stock, thick, erect stems covered with bluish-green leaves and bearing heads of pinkish green, Sedum-like flowers. It grows only on acid soil and presents great variations according to the country where it lives. *R. linifolia* and its red-flowering vars. *rubra, lanceolatum,* and *ovatum* are Siberian; while *Tachiroi* is Japanese. The roots of *R. rosea* have a rose-like odour. They all want a moist situation on the rockery. Seed. See SEDUM.

RHODODENDRON. A large group of shrubs that need not be introduced to any of my readers. In this place, moreover, we can consider only those which are dwarf, dense, creeping, and are really rock plants. The alpine ones, called in Switzerland wrongly "Alpen Rosen" (*ferrugineum* and *hirsutum*), are of easy cultivation if only they have a porous well-drained soil, leaf mould, loam and sand, and a half-shady place.[40] *R. Kotschyi* from

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[40] It is said that the Central China, Yunnan and Tibetan Rhododendrons are calcicole and grow on pure lime!

Transylvania, *Lapponicum* of the boreal regions, are of same nature. But *R. Kamtschaticum,* a rare beauty of Northeast Asia and Alaska, is very difficult, at least for us Continental people. It wants a well-drained peat bed and *snow in winter!* The splendid *R.* (*Rhodothamnus*) *chamæcistus* is one of the most delightful shrubs for the rockery. Its subterranean trunks and the aerial branches make big, dense tufts of green, hanging from the cliffs, and the very numerous saucer-wide pure pink flowers constitute one of the marvels of the Austrian and Italian Alps from the Bergamasque or Lepontine Alps to the Austrian Far East. On the limestone it is rather abundant everywhere, and gives these picturesque Alps one of their characteristic notes. It dislikes to be moved, and prospers in a mixture of peat, leaf mould, and rough sand, with some chips of limestone and in a half-sunny place. Prop. by cuttings, division, or seed.

Varieties of Rhododendron sometimes met in gardens are: *R. ferrugineum album, R. f. grandiflorum* (I once found in the rich Val Germanasco leading to the Col d'Abries (Piedmont) a large space 10 to 12 metres across of *R. ferrugineum* with double flowers!) ; *hirsutum album, R. intermedium* is a natural hybrid, *ferrugineum* x *hirsutum.*

RHODORA *canadensis,* a kind of Rhododendron growing in the American boreal regions; it is 80 cm.-1 m. high; has purple-carmine flowers in heads and blooms in April and May.

RODGERSIA. Bronzeleaf. These Saxifrages are tall East Asiatic plants with big and showy leaves and small white or whitish flowers in large panicles. They all want a moist, shady place, deep, spongy soil and are raised from seed or by division. *R. æsculifolia* from China (50 cm.), with horse-chestnut foliage and rose-white flowers; *R. pinnata,* from Japan (40 cm.), bronzed foliage, flowers in a loose feather pinkish white; *R. podophylla* from Japan (60 cm.), yellowish; *R. Purdomi,* from China (60 cm.), white; *R. sambucifolia,* from China, cream white; *R. tabularis,* from Japan (1 m.), white. Seed or division.

ROHDEA *japonica.* A curious liliaceous plant with tufts of very showy, leathery, evergreen leaves, 50 cm. high; little white flowers on short stems succeeded by red berries; half shade. Division or seed (slow germ.). There are in Japan a great number of varieties, some of them reaching high prices! The var. *Kinjisnometza* has been sold for 1000 pounds.[41]

ROMANZOFFIA *Sitchensis, Suksdorfii,* and *Unalakensis.* Nice hydrophillaceous plants from the boreal-arctic regions of America. The first is a dense tuft of dark green foliage, brown underneath, bearing numerous white stars. I saw it adorning the damp and shady rocks in the Cascade Mountains mixed there with a dwarf Mimulus and some delicate Nemophyla. The second is a diminutive of it and the last a bigger one with larger, erect leaves. All want a shady and moist place on the rockery and sandy leaf mould. Seed.

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[41] See an important note on Rohdea in *Gard. Chr.,* 30 Oct., 1926, p. 347.

ROMULEA. Small, sometimes minuscule Irids with Crocus flowers, belonging to the Mediterranean coasts and flowering in early spring. The following are in gardens: *R. Bulbocodium, candida, Columnæ, ramiflora,* and *Requienii.* Well-drained spot, dry and very sunny. Seed (slow germ.).

ROSA. The Briars are rather big things to be admitted here; but some are really alpine and we cannot let them escape notice. The following can be recommended for the rockery. They want room and are grown from seed (slow germ.) or cuttings:

R. alpina IV-V; 1 m.; bright carmine; Eur., Si.; 1.
R. altaica IV; 80 cm.; cream white; Si.; 1.
R. Eglanteria V; 1.50 m.; bright vermillion; Or.; 1.
R. Fortuniana VI; 1 m.; pure white; Jap.; 1.[42]
R. lutea V; 1 m. 50; sulphur yellow; Or.; 1.
R. pimpinellifolia IV; 80 cm.; white; Eur., Si.; 1. L.
R. pyrenaica IV; 50 cm.; carmine; Py.; 1.
R. rubiginosa, Sweet Briar, V; 1 m.; flesh rose; S. Eur.; 1.
R. rubrifolia V; 1 m.; pink; Eur.; 1.
R. Watsoniana V; 80 cm.; whitish; Jap.; 1'.

There are also some garden forms which are rare treasures and create great excitement among the visitors to Floraire when in flower. Firstly that marvel we found through our friend Colonel Roulet, in a high village of the Swiss Jura, and which we called *R. Rouletti*.[43] It never reaches more than 10 cm. high and is covered with bright rose flowers from April to November. It belongs to the India group but nobody knows its history. Then a curious and unknown Rosa I got 30 years ago from Count Gilberto Borromeo, which grows in a wild corner of the Isola Bella and which creates the greatest interest here, the flower changing its colour during its life; it begins by being pale yellow, the second day the yellow is dark; then it passes to a copper red, then to a bright pink, and finally dies as a dark carmine. Nobody being able to give any information about the plant, which reaches 1-2 m. high and flowers from June to December, I baptized it *R. mutabilis*.

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[42] In her splendid album, *The Genus Rosa,* Pl. 36, p. 109, Miss Ellen Willmot gives an illustration of *R. Fortuniana* which does not correspond at all with the *R. Fortuniana* we have at Floraire, which is a beautiful, single, pure white flower, very fragrant, disposed in large erect panicles (sometimes 50 cm. long). What is my *R. Fortuniana?* Nobody knows!

ROSCŒA. A small genus belonging to the Scitamineæ near to the Gingers, of Asiatic origin and rather recent in gardens. There are different species coming from the Himalayas, Sikkim, and China. They are half tuberous and must be planted deeply in a rich and well-drained soil. *R. alpina, auriculata, intermedia, purpurea,* and *Sikkimensis* have purple flowers. The foliage is that of Zingiber and the flowers have some similitude with Gladiolus; they form loose spikes on 20-30 cm. high foliate stems. Mr. A. K. Bulley introduced from China twenty years ago the splendid *R. cautliæides* of a beautiful soft yellow being only comparable to the unique colour of Kirengeshoma. All like half shade. Division and seed. *Rottlera Forrestii* (*Oreocharis Forresti*) is a very curious Gesnerad with the appearance of Ramondia. Found by Forrest in 1906 in the Yunnan at 3000

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[43] See *Gard. Chr.*, 9 Dec., 1922, p. 342.

m. alt., it was introduced by A. K. Bulley at Ness, England; but as it could not stand the climate he gave his stock to Mr. Hornibrook of Knapton, where the plant flowered and seeded; Mr. Hornibrook gave the Glasnevin Botanic Garden thirty seedlings, and now the plant is introduced in England. But, alas, how difficult it is! I got one of these seedlings but lost it soon after. Mr. Hornibrook wrote me: "It is very like a Ramondia, but its flowers are small and of a pale yellow. Except for keeping it from hard frost in winter I always treated it exactly like the Ramondia." A photo of it was published in the *Gard. Chr.* (Oct. 30, 1915, p. 279); the leaves are those of *Ramondia pyrenaica,* but the flower recalls that of Gesnera."[44]

RUBUS. The Brambles are generally to be avoided in a rockery, but some of the creeping species of Rubus are modest little things and even real treasures for the alpine garden. We may mention: *Rubus arcticus,* a creeping, stoloniferous Raspberry not exceeding 10 cm. in height, bearing all summer through nice bright carmine-rose flowers and sometimes, in the cold zones, delicious fruits. It likes peat and half shade, but is rather invading. That invasion, however, is healthy for some plants, and we found that our *Cypripedium Calceolus* never succeeds better than when invaded and carpeted by *Rubus arcticus.* The Stone Bramble (*R.*

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[44] Mr. A. K. Bulley wrote me in 1923, ". . . the Rottlera and even none of the Chinese Ramondia-like plants are of any use for your climate. They are all tender; the best is *Didissandra lanuginosa.*" (June 23, 1923.)

saxatilis) of the limestone mountains is a creeping, trailing shrub with brilliant red berries which rapidly covers the soil and may be used for barren slopes. But the famous Cloudberry (*R. Chamæmorus*) a native of the Scandinavian and Scottish moors, with large leaves, white flowers, and excellent gold-yellow berries, very much used and praised in the North, is a difficult thing. I only once saw it well grown, in Mr. Maurer's garden at Jena, Saxony, on a moorbed watered from below.[45]

RUELLIA *ciliosa.* A North American Acanthad bearing, from June to September, lilac-blue flowers on 50 cm. high, leafy stems. Half sun in ordinary soil. Seed or division.

RUMEX. Sorrel-Patience. This genus offers little but *R. alpinus,* Monk's Rhubarb, which is a remedy—the unique remedy—for cancer. When I published my first book on medicinal plants (*Le Jardin de l'Herboriste*) in 1895 I did not mention this and received four letters from different countries giving information on this point. A London physician, a Paris one, another in Alsace, and then a lady in Lyon wrote me that the root of the plant, according to someone in a state of hypnosis or in some old books, was said to heal the cancer. In a new edition of that work published during the war these statements were included and a French horticulturist in Hyères, who followed my directions after being given up by the physicians, was healed in a few weeks.[46]

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[45] From the beginning of this century a large number of Rubus, mostly climbing, have been introduced from China, especially by Mr. E. H. Wilson. See *Gard. Chr.,* 1913, first part, pp. 147, 149, 165-167.

Ruscus. Butcher's Broom. Dwarf evergreen shrubs of the Asparagus family suitable for shady places. They have minute inconspicuous flowers curiously situated at the centre of the leaf-like branch (cladode) and followed by a large crimson-red berry. They belong to the Mediterranean regions and the south of Europe and are represented in our gardens by *R. aculeatus, hypoglossum, hypophyllum,* and *racemosus,* all wanting shady places. The beautiful climbing *R. Androgynus* from the Canary Islands is not quite hardy with us. Division or seed (slow germ.).

Ruta. Rue. An aromatic and medicinal genus of dwarf half shrubby or creeping plants belonging to the south of Europe. *R. angustifolia, bracteosa, graveolens,* and *montana* have bluish-green foliage and yellow flowers; they want a sheltered, dry, and sunny position (*graveolens* only of the above mentioned is quite hardy). Two Oriental kinds, *Ruta* (*Haplophyllum*) *Boissieri* and *patavina,* are stoloniferous and even invading; dwarf, slightly glaucous, and bear all through summer bright yellow flowers. Sunny and light, sandy soil. Division or seed (slow germ.).

Sagina. Pearlwort. Minute carpeting plants near Arenaria, valuable for the paved walk or for making dwarf lawns; the foliage is very thin and numerous white flowers all summer. Those grown in gardens are the *S. Boydii, bryoides, Linnæi, procumbens,* and *subulata.* Seed or division.

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[46] See H. Correvon, *Plantes et Santé,* Geneva and Paris, 1917. *The Garden,* London, 28, VII, 1917, has a similar account.

SALIX. Willow. These alpine shrubs are quite dwarf and minute in high regions, and also in the arctic zone. Not for their thin yellow flowers, but for their nice green leaves, their prostrate habit, and the rusticity of the race can they be recommended. They carpet the north facing the damp slopes of our Alps to 2500 m. alt. and in arctic lands some of them are the only green of the ground. *S. arbuscula, cæsia, glauca, Helvetica, laponum, polaris, pyrenaica* are small shrubs 80 cm.-1 m. high, European and boreal; while *S. hastata, herbacea, reticulata, retusa,* and *serpyllifolia* never exceed 6-8 cm. and sometimes cover large spaces of ground. They like a cool corner of the rockery, a north-facing wall, and succeed easily in any garden soil. Cuttings, division, or seed.

SALVIA. Some Sages are welcome in the rock garden when they are not too large and encumbering. Good loam, well-drained soil, and sun. Seed.

S. Æthiopsis VI-VII; 50 cm.; white; Med., Or.; 1.

S. angustifolia VIII-X; 80 cm.; deep blue; Mexico; 1.*

S. argentea VII; 50 cm.; silver white; Or.; 1.

S. azurea VIII-XI; 1 m.; sky blue; N. Am.; 1.

S. Cadmica VII-IX; 50 cm.; lavender blue; Or.; 1. (Aromatic.)

S. candelabrum VII; 40 cm.; yellow and violet; Sp.; 1. (Aromatic.)

S. carducea VI-VII; 50 cm.; light blue; Cal.; 1.

S. cretica; an erect form of *S. officinalis.* (Very aromatic.)
S. eriophora VII; 15 cm.; blue; woolly; Or.; 1.
S. flava VII; 60 cm.; yellow; Ch.; 1.
S. glutinosa VII-X; 60 cm.; yellow brown; Eur.; 1, 2.
S. grandiflora VII-XI; 50 cm.; blue; Or.; 1. (Aromatic and M.)
S. Hyans VII; 50 cm.; blue and white; H.; 1, 6.
S. leucophylla VI-VII; 80 cm.; light purple; Cal.; 1.
S. mellifera VII; 1-2 m.; white and lilac; Cal. (Aromatic shrub.)
S. officinalis VI-IX; 40 cm.; Eur.; 1. (Strongly aromatic and M.—vars. *alba* and *rosea.*)
S. pratensis VI-XI; 30 cm.; dark blue; Eur.; 1, 7. (Vars. *alba, atroviolacea, bicolor, rosea.*)
S. ringens VI-X; 30 cm.; sky blue; Or.; 1, 7. (Aromatic.)
S. scabiosæfolia VII-IX; 40 cm.; white and purple; 1. (Very aromatic.)
S. sclarea VII-XI; 60 cm.; white, purple, and blue; S. Eur.; 1, 7. (Strongly aromatic and M.)
S. spathacea VII-IX; 80 cm.; crimson; Cal.; 1.*
S. taraxifolia VII-VIII; 50 cm.; pale rose; At.; 1.*
S. virgata VII-IX; 40 cm.; lilac and white; Or.; 1.

SAMOLUS *Valerandi.* A small Primulad disseminated all over the world in wet places but never common. It is a gay green plant bearing, on 10-15 cm. high stems, little pure white stars from May to October; it seeds itself all over the wet places. From New Zealand and Australia we received several dwarf minute species of carpeting character and pinkish white flowers which are not quite hardy here.

SANGUINARIA *canadensis.* Bloodroot. Graceful Poppy-like plant with a thick, fat root bleeding at every injury, as do its aerial parts too. The leaves, 10 cm. high, are glabrous and glaucous, very elegant, and the white fugitive flower opens like a cup on 10 cm. high stems (IV-V). The plant is very abundant all over North America in shady woods and the delightful white stars are one of the marvels of the North American woods, where it really covers the ground in the cool places. There is a var. *fl. pl.* and one *grandiflora.* It wants a shady corner, rather moist, and deep leaf mould. Seed or division.

SANGUISORBA. Burnet. These curious Rosales are common in wet lands and marshes; the dark brown European one, *S. officinale,* with its dense ovate spikes almost black in colour (the same shade as in *Nigritella nigra*), can be recommended for wet places, near or along the water's edge; it does not exceed 50 cm. high, but its American cousin *S. canadensis* is much bigger and has pinkish spikes. The best of all is certainly the statuesque *S. Vallistellinæ* (*dodecandra*) which grows in certain subvalleys of the Valteline. There, in cool green pastures, at about 1000 m. alt., you may see these charming 50-60 cm. high bushes of herbaceous bunches with their glaucous foliage and the long furry tails of fragrant creamy white flowers which give the whole landscape a special character. In shady corners, on the same level, you may find the Graceful Fern (*Struthiopteris germanica*) and, higher up, on the dark *pierriers* you may pick the charming *Viola comolia.* All the Sanguisorbas want a cool corner and a loamy soil. Division or seed.

SANICULA. Small Umbellifers of deep woods in the Northern Hemisphere; they are unobtrusive things but have the advantage of enduring the darkest shade and growing in the worst underwood. *S. europeæa* and *S. Marylandica* are the best known. Seed or division.

SANTOLINA. Lavender Cotton. Aromatic and strongly bitter shrubby herbs which haunt rocky and sunny places in Southern Europe and are beloved for their silver-white finely cut foliage rather than for their yellow Daisy-like flowers. *S. canescens* and *S. Chamæcyparissus* are the two generally adopted. They do not exceed 30 cm. in height and are dense silver-grey tufts which can be pruned like Box and are especially used in our country for edging graves, and for borders in very sunny and dry conditions. Cuttings, division, or seed.

SAPONARIA. Soapwort. An interesting genus of Cariophyllæ, the type of which is the medicinal *S. officinalis* which, during the last war, was largely used for making soap. Some are strong-growing plants, others dwarf cushions or carpeting alpines good for the sunny places on a rockery or on a wall. Cuttings and seed. (See color plate facing p. 406.)

S. bellidifolia V-VII; 15 cm.; lemon yellow; S. Eur., Or.; 1.

S. Boissieri; a beautiful hybrid, *ocymoides* x *cæspitosa*; VI-VIII; 4.

S. cæspitosa V-VI; 8 cm.; bright rose; Py.; 4, 6.

S. cerastioides. See *Gypsophila.*

S. cypria VII-VIII; 8 cm.; deep carmine; Or.; 4, 6.
S. depressa VI; 5 cm.; pink; Gr.; 4, 6.
S. Kotschyi IV-V; 20 cm.; rose; Or.; 1, 4.
S. læta; a hybrid, *Boissieri* x *ocymoides.*
S. lutea VI; 5 cm.; pale yellow; Ped. Al.; 4, 6.
S. nana. See *Silene pumilio.*
S. ocymoides IV-VII; 25 cm.; bright pink; Eur.; 1, 4. (Very creeping.) (Vars. *alba, rosea,* and *splendens* (bright carmine).)
S. officinalis VI-XI; 60 cm.; light rose (carmine in the Pyr.); Eur.; 1, 7. (Some vars. *alba, flore pleno,* and *grandiflora.*)
S. pulvinaris VII; 5 cm.; pink; Lib., Or.; 1, 4, 6.
S. Weinmanniana; a cross, *cæspitosa* x *lutea.*

SARMIENTA *repens.* A beautiful and very brilliant Gesneriad from the Chilian Alps, forming dense tufts of Vaccinium-like foliage with bright scarlet flowers which must be grown like certain epyphitic Orchids on a Fern trunk or dead wood in a sheltered, well-situated spot. Not hardy with us.

SAROTHAMNUS. See CYTISUS.

SARRACENIA. Pitcher-Plant. These curious carnivorous plants grow in the marshes and bogs of North America, and in Canada are found in pure sphagnum. They have few and always very poor roots, for they are nourished by the insects they catch in their urn-shaped leaves. Their flowers are yellowish and more curious than beautiful, but the foliage, marbled with green and red, is quite ornamental. *S. purpurea,* the hardiest of all, has been abundantly naturalised in the marshes about Vevey and the Jura by Dr. F. Cornu, who brought pounds of seeds from Canada. The plant succeeds in every sphagnum bed, watered from below, and seeds well with us. The famous botanist-wanderer, Roezl, published in the *Belgique horticole* for 1884 a note describing the North American Sarracenia and said that *S. flava, psittachina,* and *rubra* must be as hardy as *purpurea.*

SATUREYA. Savory. These small Thymes, near relatives to the Micromeria, belong to the south of Europe, and are late-flowering rock plants; they make dwarf and dense aromatic bushes with numerous little flowers and are much appreciated by the bees. They want full sun and rocky, gritty ground. Cuttings, division, or seed.

S. Boissieri VIII; 20 cm.; light pink; Or.; 1, 4.
S. diffusa VIII-XI; 10 cm.; light rose; Or.; 1.
S. intermedia (*mutica*) VII-IX; 20 cm.; lilac; Or.; 1.
S. montana VII-XI; 20 cm.; rose lilac; Med., Or.; 1, 4.
S. pygmæa (*Illyrica*) VIII-XI; rich violet; E. Al.; 4, 6.
S. rupestris VII-X; 25 cm.; white; E. Eur.; 1, 4. (Very aromatic.)
S. stenophylla VIII-IX; 15 cm.; rose; S. Eur.; 1, 4.

SAURURUS *cernuus.* Lizard-Tail. A bog plant from Japan and North America, ramping and invading, with cordate leaves on 30-40 cm. high stems and white flowers. This is a Piperacead and, I think, the only plant of that family hardy with us.

SAUSSUREA. Bluish-purple Composites from the high regions with hard and very dense heads of flowers; they grow on the stony slopes in alpine regions and in Asia, in the Himalayas up to 5500 m. altitude. Not of easy culture; they want a moist and porous soil and half sun. *S. alpina,* purple blue; *depressa,* reddish purple; *discolor,* purple blue with the leaves white underneath; *pygmæa,* the best of all, with a large head of purple-blue flowers; 6, 9, 10. Seed or division.

SAXIFRAGA. They have been named with reason the "Backbone of the rock garden." Do they really break the stones as their name implies? At any rate, with the Androsaces and the Sempervivums they constitute the real, the true, rock plants. Upwards of 400 true species and many thousand varieties and hybrids are recognised. Some gardeners, especially in Germany, are announcing new "crosses" every year in order to have new names in their catalogues—a rather lamentable practice, not only from a scientific point of view, but even from the standpoint of art. If some genera like Rose, Gladiolus, Iris are precious in their horticultural forms for garden purposes, these small rock plants, confused and entangled, lose their origin and personality. We have now such an enormous number of varieties that there is no amateur, however clever he may be, who can collect them all. The natural hybrids are themselves so numerous that no garden can even have them all.[47] Now, the dealers' lists come every year with dozens of new names in such profusion that we cannot follow the movement without giving up the good old things and that is a great pity. Therefore, we limit our list to those hybrids which are really valuable and have a definite character.

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[47] See Mr. Hornibrook, "Hybrid Saxifrages," in *Journ. of the R. Hort. Soc.,* Vol. LI, 1926.

The Saxifrages have been divided from a scientific point of view into fifteen sections, excluding the Megasea (Bergenia) and the Peltiphyllum group, both of which, however, we include here.[48] They belong to the mountain regions of the Northern Hemisphere and generally to cold countries and are especially numerous in the boreal regions. They are generally perennial and cæspitose; a few only are annuals.

The cultural requirements of the Saxifrages are very variable, according to the different sections; they generally correspond to the botanical groups, but there are numerous exceptions. Propagation from seeds sown on the surface of a pot filled with very fine soil (the seeds being themselves very thin) and not earthed over, but with glass or paper atop to keep them close and dark. A dangerous fungus, *Puccinia saxifragæ,* is sometimes working hard against the poor little treasures. It must be destroyed by fire or by specially suitable preparations like X-All, Semesan, etc.

SECTION *Megasea* or *Bergenia.* Large plants with big, leathery, glossy, round, or oblong leaves and, in early spring, short-stemmed racemes of pure rose, light or deep pink or white flowers; they belong to Northeastern and Central Asia, and the type is the old *M. ligulata* (not Lingulata) introduced to England in the eighteenth century.

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[48] See Engler's *Pfl. Reich.,* "Saxifragaceæ," Leipzig, 1916.

Some garden vars. have been published in the last century. Good loam, half shade.

S. *ciliata* III; 30 cm.; pinkish white; H., Nepaul; 1.
S. *cordifolia* III-V; 30 cm.; bright flesh rose; Si.; 1. (A var. *alba.*)
S. *crassifolia* (*bifolia*) XII-IV; 40 cm.; bright rose; Si.; 1.
S. *Delavayi* IV; 40 cm.; deep rose; Y.; 1.
S. *ligulata* I-V; 50 cm.; pure rose; Nepaul; 1. (A var. *alba.*)
S. *Milesi* IV; 40 cm.; white; H.; 1.
S. *pacifica* IV; 30 cm.; bright carmine; N. E. As.; 1.
S. *purpurescens* III-V; 30 cm.; bright carmine; H.; 1.
S. *splendens;* a hybrid with big pink flowers.
S. *Stracheyi* III-V; 40 cm.; light pink; H.; 1.
S. *thysanodes* (*hirsuta*); a very villose *cilata.*[49]

SECTION *Boraphilla.* Low plants with soft leaves all at the base forming rosettes; flowers in a spike or a shower. They prefer a damp, cool place and their type is *S. stellaris.* Division or seed.

S. *Clusii* VI; 10 cm.; pale pink; Al., Py., Sp.; 9, 10.
S. *Columbiana* IV; 25 cm.; whitish; R. M., Canada; 9, 10.
S. *Forbesi* VI; 40 cm.; whitish; R. M.; 1, 3.
S. *hieracifolia* V-VII; 20 cm.; reddish; E. Al., Cp., Sc.; 1, 3.
S. *integrifolia* VII; 30 cm.; whitish; R. M.; 1, 3.
S. *leucanthemifolia* VI; 50 cm.; white; N. Am.; 1, 3.
S. *Lyallii* VI; 30 cm.; white; R. M.; 3, 6.
S. *Mertensiana* VI; 30 cm.; white; R. M.; 1, 3.
S. *micranthidifolia* (*erosa*) VII; 60 cm.; reddish; N. Am.; 1', 3.
S. *nivalis* VI; 10 cm.; white; Sc., Ar. R.; 6, 9, 10.
S. *Nootkana* IV; 10 cm.; white and pink; N. Am.; 6.
S. *occidentalis* VI; 15 cm.; white; R. M.; 6.

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[49] See F. W. Burbidge on "Giant Rockfoils" (Megasea), *The Garden,* 1889; *Deutsch. Gaertn. Ztg. Erfurt,* 1890-1900, the 28 vars. obtained in Erfurt; Cat. No. 74 (1910) of Mr. T. Smith in Newry, Ireland, who makes a specialty of them.

S. odontophila V; 10 cm.; white; H.; 6, 10.
S. Ohiœnsis; an Ohio form of *virginiensis.*
S. oregana IV; 20 cm.; whitish yellow; R. M.; 1, 6.
S. pallida IV; 15 cm.; pinkish white; H.; 9.
S. pennsylvanica V-VII; 40 cm.; reddish; N. Am.; 1, 3.
S. ruffidula IV; 10 cm.; white; R. M.; 6, 9, 10.
S. stellaris IV; 10 cm.; white and pink; Eur., Si., N. Am.; 3, 9, 10.
S. strigosa V; 10 cm.; white; H.; 9.
S. virginiensis VI; 10 cm.; whitish; N. Am.; 3, 9, 10.

SECTION *Cymbalaria.* These are few and all more or less annuals; but as they do reproduce themselves without help, and since, once in a place, they continue to live and flower every year, we make an exception in this case and include them on our list. There are four different kinds, all very near each other, with yellow flowers, grey-green glabrous foliage, never exceeding 30 cm. high and flowering all the summer through. *S. Huettiana,* the dwarfest of all, has bright yellow flowers and never exceeds 10 cm. high; *S. Cymbalaria* (*Orientalis*), *S. hederifolia,* and *Sibthorpii* are all native of S. Eur. or belong to the Med. and Or. regions; they have more or less brilliant flowers and want a shady and moist corner on a well-drained, stony soil.

SECTION *Dactyloides.* The Mossy Saxifrages have cæspitose growth; their type is *Saxifraga cæspitosa;* their form is that of a large flat cushion with numerous densely foliate stems, pressed one against another, forming, more or less, a dense carpet and bearing numerous flowers on slender stems. They like half shade and cool, porous, well-drained soil. Seed, cuttings, or division. The high alpine ones are of rather difficult cultivation and often want to be on the moraine. This section is the most extensive and the most variable of all, and Engler gives us about fifty types divided in twelve subsections and an enormous quantity of varieties and natural hybrids. The "fabricants" of novelties freely exercised their proclivities in this group and have given us masses of varieties with bright pink, carmine, or rose forms. The mountains of Southwestern Europe are especially rich in Saxifrages of the Dactyloides group. In the Eastern Pyrenees (Vals d'Eyne and Llo) I have seen more than forty different species and vars.[50]

S. affinis. See *Sponhemica.*

S. ajugæfolia IV-VI; 5 cm.; white; Py.; 3, 5, 9, 10.

S. Allionii (*Kingii, densa*) IV; 5 cm.; white; Al.; 4, 6.

S. Androsacea IV; 8 cm.; white; Eur., N. As.; 8, 9, 10.

S. aphyla (*stenopetala*) IV; 3 cm.; straw yellow; high Al.; 8, 9, 10.

S. aquatica (*adscendens*) V; 30 cm.; white; Py.; 3, 6.

S. Arendsi; a good pink hybrid, *Rhei* x *hypnoides* var. *purpurea.*

S. atropurpurea III; 5 cm.; bright carmine; Al.; 6.

S. cæspitosa IV-V; 8 cm.; white and pink; Eur.; 1. (Numerous vars. and hybrids.)

S. Camposii IV; 15 cm.; pure white; Sp.; 1, 4, 6.

S. canaliculata V; 20 cm.; white; Sp.; 1, 4.

S. capitata; hybrid; *ajugæfolia* x *aquatica;* Py.; 6, 9.

S. Cebenensis. See *Prostiana.*

S. ceratophyla. See *trifurcata.*

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[50] See in *Bull. Soc. Bot.,* France, 1910-1915, the notes of Mr. D. Luiset: "Contribution à l'étude des Saxifrages du groupe Dactyloides."

S. cervicornis; a thin Corsican form of *pedemontana.*

S. citrina IV; 5 cm.; yellowish; Al.; 4, 6, 9.

S. Clibrani; bright pink hybrid, *atropurpurea* x *cæspitosa.*

S. conifera VI; 5 cm.; white; Sp.; 4, 6.

S. Corbariensis VI; 15 cm.; white; Cévennes; 4, 6.

S. cuneata VI; 10 cm.; white; Sp.; 4, 6.

S. cymosa; a dwarf Balkanic *pedemontana;* 4, 6.

S. decipiens V; 15 cm.; white, yellowish, pink, etc.; W. Eur.; 1. (Numerous vars. and hybrids.)

S. depressa V; 10 cm.; white; E. Al.; 9, 10.

S. erioblasta IV; 10 cm.; white; Sp.; 4, 6.

S. exarata IV-V; 5 cm.; white, rose, etc.; Py.; S. W. Eur.; 4, 6. (Very polymorphic; numerous vars. and hybrids.)

S. Facchini IV; 2 cm.; light yellow; E. and S. Al.; 4, 6, 10.

S. geranioides IV-VI; 20 cm.; pure white; Py., Cévennes; 1, 4.

S. Gibraltarica V; 10 cm.; white; Sp.; 4, 6.

S. glabella IV; 10 cm.; white; S. E. Eur.; 4, 10.

S. globulifera IV-V; 8 cm.; white; Sp.; 1', 4, 6.

S. granatensis V; 10 cm.; white; Sp.; 4, 6.

S. grœnlandica IV; 5 cm.; greenish white; Sc., Br., Py.; 4, 9, 10.

S. Hausknechtii; a hybrid, *decipiens* x *granulata.*

S. Hohenwartii; an alpine form of *sedoides.*

S. hypnoides IV-V; 10 cm.; white; S. W. Eur.; 1, 4, 6. (Numerous vars. and hybrids.)

S. intricata V-VI; 5 cm.; white; Py.; 4, 6. (Numerous vars.)

S. Iratiana VI; 10 cm.; white; Py.; 4, 6, 9.

S. Maderensis VII; 20 cm.; white; Madeira; 4, 6, 9.*

S. Maweana; an Atlantic form of *globulifera.*

S. mixta; a dwarf, dense, and aromatic *S. pubescens.*

S. moschata IV; 5 cm.; yellowish white; glacial reg. of Eur.; 10. (Numerous vars. and hybrids.)

S. Muretti; a hybrid, *aphylla* x *muscoides.*

S. muscoides (*varians*) IV-V; 5 cm.; yellowish white; Eur.; 6, 10. (Very variable.)

S. nervosa V-VI; 5 cm.; white; Py., Sp.; 4, 6.

S. *nevadensis* V; 15 cm.; light rose; Sp.; 4, 6.
S. *obscura* IV; 10 cm.; white; Py.; 4, 6.
S. *oranensis;* an Algerian dwarf var. of *globulifera.*
S. *palmata; geranioides* with broad and palmate leaves.
S. *pedatifida* V; 15 cm.; white; Cévennes; 1, 6.
S. *pedemontana* IV-V; 15 cm.; white; S. Al.; 4, 6.
S. *pentadactylis* V; 20 cm.; white; Py.; 1, 6.
S. *Prenja* V; 5 cm.; white; Ba.; 9, 10.
S. *Prostiana* (*Cebenensis*) V; 15 cm.; white; Cévennes, Py.; 4, 6.
S. *pubescens* VI; 5 cm.; whitish pink; Py.; 4, 6.
S. *pygmæa* V; 5 cm.; white; Eur.; 4, 6.
S. *Rhei;* a loose form of *moschata,* which gives numerous good vars., with pink or carmine flowers.
S. *sedoides* V; 10 cm.; yellowish; S. E. Al.; 4, 6, 10.
S. *Seguieri* IV; 2 cm.; greenish white; high Al.; 9, 10.
S. *spathulata;* a dense N. African *globulifera.*
S. *Sponhemica* (*affinis*) V; 10 cm.; white; W. Eur.; 1, 6.
S. *Sternbergii* IV; 10 cm.; white; Sp., Br., Arc. Am.; 6, 9.
S. *tenella* VI; 8 cm.; white; E. and S. Al.; 1, 6.
S. *tridens* V; 5 cm.; cream white; Ab.; 9, 10.
S. *trifurcata* V-VII; 10 cm.; pure white; Py., Sp.; 1.
S. *valentina* V; 20 cm.; white; Sp.; 1, 4, 6.
S. *varians.* See *muscoides.*
S. *Vayredana;* a dense and thin-leaved *trifurcata.*
S. *Willkommiana* V; 15 cm.; white; Sp.; 1, 6.

Among the mass of hybrids and vars. offered in the catalogues there are some really good and beautiful ones, especially the pink, rose, carmine, or yellowish vars. of *decipiens* and *Rhei* (*S. Apple-Blossom; Arendsi; Arkwrightii; Blutenteppish; decipiens-grandiflora, decipiens-lutescens, Guilford seedling; Jewell; Lady Dean; Lloyd Edwards; magnifica; Purpurmantel; Rhei superba; Rose Beauty; sanguinea-superba; Teppich Koenigin; White Queen; Red Admiral,* etc.)

SECTION *Diptera.* Here are the stoloniferous Saxifrages from the Far East; some are runners and sarmentose and their type is the *S. sarmentosa,* Mother of Thousands. They are not all hardy and must have a sheltered, half-shady place in the garden and a light, well-drained, peaty soil. Their peculiarity is in having their two upper petals much longer, obovate-lanceolate, thus having the appearance of a Diptera. There are only ten species of this group, of which half only are in cultivation. Seed or division.

S. cortusifolia V; 20 cm.; white; Jap.; 6.*
S. cuscutiformis IV-VI; 5 cm.; rose; Jap.; 6.* (A diminutive *sarmentosa.*)
S. Fortunei IX-XI; 30 cm.; white; Jap.; 6, 9.*
S. Japonica; a *sarmentosa* with thicker unspotted foliage, dark green on the upper side, brown red underneath; denser habit.
S. madida VI; 25 cm.; white; Jap.; 6.*
S. sarmentosa, Mother of Thousands, IV-X; 10 cm.; rose; Jap., Ch.; 1, 6.

SECTION *Euaizoonia.* The Encrusted Saxifrages are the rock and saxatile plants "par excellence" and the hardiest of all. Their type is *S. aizoon* with its silver-grey leaves, saw-edged and serrate-dentate, and with white flowers, more or less dark pink punctate. This section is almost strictly European; two are Caucasian; the type *aizoon* reaches the arctic regions and in North America to Greenland and Labrador. This is a very numerous group and more variable than any of the others; *S. aizoon* alone has vars. and hybrids too numerous to mention; Engler gives 77 vars. and 12 hybrids and nurserymen list many more; and, as *S. aizoon* crosses so readily and its children are again fertile, the turmoil is not lessened. Plants of this section are generally chalk-liking. When on granite, *S. aizoon,* for instance, varies immediately and gives us other types. In gardens these plants are but indifferent and succeed on any sunny, exposed place, between stones, or on flat ground, but never on damp soil. They are really xerophile and like well-drained places. Seeds or division.

S. aizoon V-VI; 40 cm.; white, spotted with pink; Eur., N. Am.; 1, 4.

The most important vars. of the type are: *atropurpurea* (*balkana*) with pink flowers; *baldensis,* from S. Tyrol, a very small one; *brevifolia* with short leaves, 1 cm. long and ½ cm. broad; *cultrata* from Transylvania, leaves larger at the apex than at the base; *Correvoniana,* named by Farrer, is a very minute one from the Tyrol; *elongata* from the Cent. Al., with linear-spathulate leaves; *flavescens,* S. Al., with yellowish flowers; *gracilis,* from S. Tyrol, is very small with short leaves, deeply serrate; *intacta,* from E. Al., a large plant with pure white flowers; *labradorica,* dwarf dense form with round rosettes; *læta* from the Cp. is very small with regularly sharp dentate leaves; *linguiformis,* from the French mountains, has 3 cm. long and ½ cm. broad leaves and the flowers in loose panicles; *Malyi* from the Balkans, 25 cm. high, with narrow spathulate leaves very regularly dentate; *minima* is a very small *aizoon* from the old walls in N. It.; *notata,* a compact plant with incurved broad leaves, rosettes, and cream-coloured flowers; *pectinata,* natural hybrid, *aizoon* x *intacta,* with handsome, dark, very thick foliage, elegantly toothed and saw-edged; *punctata,* from Cent. Al., large rosettes of strap-shaped leaves rather feebly marked with lime and flowers densely spotted with pink; *pusilla,* very small and slender, near to *minima; recta* with obovate-spathulate leaves (2-3 cm. long on ½ cm. broad) and weak panicle of flowers; *rosea* from the Balkans is near to *atropurpurea* but paler; *rosularis,* from the E. Al., has large incurved rosettes, and broad panicles of flowers, 50-60 cm.; *Sempervivum* has thick, leathery leaves forming large incurved rosettes; *Stabiana* from Italy has 20 cm. high stem, very thick rosettes, leaves spathulate-cuneate (1-3 cm. long on ½ cm. broad), round at the apex; *stenoglossa* from Tyrol has narrow basal leaves (2½ cm. long on ¼ cm. broad), wide-spreading; *Sturmiana* from the E. Al. and Cp., has very acute teeth on the leaves with a longer and fine terminal one; *Zeleborii* from the Austrian Alps has 1-1½ cm. long leaves with truncate teeth and very thick glandulose-pilose stems.[51]

S. altissima VI; 40 cm.; white; E. Al.; 1, 4.
S. australis VI; 30 cm.; pure white; Ap.; 1', 4.
S. carinthiaca IV-VI; 20 cm.; whitish pink; E. Al.; 1, 4.
S. cartilaginea VI; 20 cm.; pure white; Ca.; 4, 6.
S. catalaunica VI; 20 cm.; white; Sp.; 1, 4, 6.
S. cochlearis VI-VII; 15 cm.; pure white on red stems; S. Al.; 4, 6.
S. Cotyledon V; 60 cm.; pure white on red stem; Al., Py., Sc., Br.; 1, 4. P.
S. crustata VI; 15 cm.; white; E. Al.; 4, 6.
S. demissa VII; 15 cm.; orange yellow; Tr.; 9. (Shady.)
S. elatior; a big form of *Hostii.*
S. Hostii V-VI; 30 cm.; white; E. Al.; 1, 4.
S. Kolenatiana VI-VII; 25 cm.; rose; Ca.; 1, 4.
S. Lantoscana V-VII; 20 cm.; white; M. Al.; 1, 4.
S. lingulata V-VI; 25 cm.; pure white; M. Al., Ap.; 1, 4.
S. longifolia VI-VIII; 50 cm.; white; Py.; 4; L.

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[51] In the summer of 1928 I saw in the former Imperial Botanical Garden at the Belvédère in Vienna the remainder of the famous collection of *Saxifraga aizoon* vars. and hybrids, made 70 years ago, by Prof. Dr. Maly, Director of the Garden. Mr. Martin, the keeper, does his best to maintain it.

S. Montavoniensis; an Eastern form of *Cotyledon* with pinkish flowers.

S. mutata VI-IX; 30 cm.; orange red; Eur.; 3, 4. (Wet.)

S. Portæ; an Apennine dwarf and dense *lingulata.*

S. Probyni; a dense and minute *cochlearis* from the Tende Alps.

S. pyramidalis; a pyrenean form of *Cotyledon.*

S. Rhætica; an east alpine form of *Hostii* with narrow leaves.

The following hybrids may be included here: *Andrewsi* (*aizoon* x *geum*), a very strong creeping plant with beautiful foliage and pink flowers; *Burnati* (*aizoon* x *cochlearis*); *Churchilli* (*Hostii* x *aizoon*); *Cotyledon* x *aizoon; Cotyledon* x *cochlearis; Engleri* (*Hostii* x *crustata*); *Forsteri* (*mutata* x *cæsia*); *Gaudini* (*aizoon* x *Cotyledon*); *Haussmanni* (*mutata* x *aizoides*); *Guthriana* (*Andrewsi* x *aizoon*); *MacNabiana* (*Cotyledon* x *lingulata*); *Regelii* (*mutata* x *aizoides*); *splendida* (*longifolia* x *Cotyledon*); *speciosa* (*Cotyledon* x *aizoon*); *superbus* (*Cotyledon* x *longifolia*); *Timbali* (*aizoon* x *Cotyledon*).

SECTION *Hirculus.* This is a sphagnum- and marsh-liking group of plants whose type, *S. Hirculus,* has entire leaves and bright yellow flowers. They belong to the Asiatic flora and, particularly, Yunnan and the Himalayas. One only is European and five are North American; there are 90 species and 70 vars. All are creeping, and can be divided or sown.

S. Brunoniana VI; 5 cm.; yellow; H.; 5, 9, 10. P.

S. diversifolia VII-IX; 30 cm.; bright yellow; H., Y.; 3, 9, 10. P.

S. flagellaris V-VI; 10 cm.; golden yellow; Ar. R., Si., Ca.; 9, 10. P.

S. Hirculus V-IX; 20 cm.; light yellow; Eur., As., N. Am.; 3, 9, 10. P.

S. turfosa VI; 25 cm.; yellow; Y.; 9, 10. P.

SECTION *Isomeria.* Woodland plants from Northeastern Asia and Northwestern America with subterraneous rhizomes, large rounded and lobed leaves; their type is *S. Tellimoides* and they like a cool situation in the rockery and a rich, loamy peat. Division or seed (see BOYKINIA).

S. ranunculifolia V; 15 cm.; white; N. Am.; 6, 9.
S. Tellimoides VI; 25 cm.; white; Jap.; 1, 2, 6.
S. tozænsis VIII; 15 cm.; white; So. Jap.; 2, 6.

SECTION *Kabschya.* This is a fine group with the aspect of Aretia-Androsace; *S. Burseriana* and *cæsia* are their real types. There are about 50 different kinds and a great many varieties. They belong to Southern and Eastern Europe, to Western and Central Asia into Yunnan and Western Hupeh. Here the fury of the "hybrid-makers" has found a favourable field of activity and I know one of them who made a fortune with such "productions." These plants are not all of easy cultivation and some of them require special treatment (*diapensoides, Tombeanensis, Wandelli,* etc.). They like a perpendicular wall or narrow fissures in the rockery; and also some that, growing naturally in sunny places, require half shade in our Continental climate. The best position is an east- or west-facing wall. They cannot stand heavy waterings and hate to be full of water when the sun beats upon them. We have lost more of them by too hard watering than by drought. At Floraire, we shade them from the full sun. If they can be watered from below that is the best treatment. As for their propagation I can recommend cuttings made in pure sand in late summer better than division of the tufts. They come easily from seed.

S. afghanica IV; 2 cm.; white-veined purple; Afghan.; 4, 9, 10.
S. apiculata III-IV; 10 cm.; pale yellow; Or.; 1, 4, 6. (A var. *alba.*)
S. aretioides III-V; 5 cm.; yellow; Py.; 4, 6.
S. Boryi V; 10 cm.; white; Gr.; 4, 6.
S. Burseriana II-IV; 8 cm.; pure white; E. Al.; 4, 6. (Vars. *crenata, gloria, grandiflora, major, sulfurea, tridentina.*)
S. cæsia V-VI; 5 cm.; pure white; Al., Py., Ab., Ap., Cp.; 4, 6. L.
S. calyciflora. See *mædia.*
S. compacta III; 5 cm.; yellow; E. Si.; 4, 8.
S. coriophylla VI; 10 cm.; white; Ba.; 4, 6.
S. corymbosa (*luteo-viridis*) VI; 5 cm.; lemon yellow; Tr.; 4, 6.
S. diapensoides VI; 2 cm.; white; S. Al.; 4, 8, 10. L.
S. Federici-Augusti VI; 5 cm.; violet; Ba., Gr.; 4, 6.
S. Ferdinand-Coburgi IV; 5 cm.; bright yellow; Ba.; 4, 6.
S. Grisebachii IV; 10 cm.; dull purple; Ba.; 4, 6.
S. imbricata IV; 3 cm.; white; H.; 4, 10. P.
S. juniperifolia V-VII; 5 cm.; yellow; Ca.; 4, 6.
S. Kotschyi IV; 5 cm.; golden yellow; Or.; 4, 6.
S. lævis VI; 5 cm.; yellow; Ca.; 4, 6.
S. lilacina III; 2 cm.; pink lilac; H.; 4, 8, 10.
S. luteo-purpurea IV; 10 cm.; reddish yellow; Py., Ba.; 4, 6.
S. mædia (*calycina*) V; 8 cm.; purplish; Py.; 4, 6.
S. marginata (*Rocheliana*) V; 10 cm.; white; Ap., Gr.; 4, 6.
S. patens; a rare natural cross, *aizoides* x *cæsia;* 6, 9, 10.
S. porophylla III; 8 cm.; yellowish purple; Ba., Ap.; 4, 6.
S. pseudo-Kotschyi IV; 8 cm.; yellow; Ba.; 4, 6.
S. pseudo-sancta IV-V; 5 cm.; yellow; Or.; 4, 6.
S. sancta V; 5 cm.; light yellow; Gr.; 4, 6.
S. scardica V; 5 cm.; pinkish white; Gr.; 4, 6.
S. Spruneri IV-V; 8 cm.; white; Gr.; 4, 6.

S. squarrosa VI; 5 cm.; white; E. Al.; 4, 6; L.
S. Stribrnyi V-VI; 8 cm.; white; Ba.; 4, 6.
S. Thessalica V; 8 cm.; purplish pink; Gr.; 4, 6.
S. tirolensis; a natural hybrid, *squarrosa* x *cæsia.*
S. Tombeanensis V; 2 cm.; white; So. Tyrol; 4, 8, 10. L.
S. Valdensis V-VI; 5 cm.; pure white; Ped., Al.; 4, 6. L.
S. Vandellii V; 5 cm.; white; Lombardian Al.; 4, 6.

Among the numerous hybrids we may name: *Bertoloni* (*Stribrnyi* x *porophylla*); *Borisii* (*Ferd.-Coburgi* x *marginata*); *Boydii* (*aretioides* x *marginata*); *Biasoletti* (*Grisebachii* x *Thessalica*); *Bileki* (*Ferdinand-Coburgi* x *Tombeanensis*); *Cherry-Trees* (*Burseriana* x *aretioides*); *Clarkei* (*Wandelli* x *media*); *Elisabethæ* (*Burseriana* x *sancta*); *Eudoxiana* (*Ferd.-Coburgi* x *sancta*); *Faldonside* (*aretioides* x *marginata*); *Godseffiana* (*sancta* x *Burseriana*); *Haagii* (*sancta* x *Ferd.-Coburgi*); *Jægeana* (*marginata* x *scardica*); *Jenkinsii* (*lilacina* x *Burseriana*); *Irvingii* (*Burseriana* x *lilacina*); *Kestoniensis* (*Burseriana* x *marginata*); *Kewensis* (*Irvingi* x *Federici-Augusti*); *Kyrillii* (*marginata* x *Ferd.-Cob.*); *mira* (*lilacina* x *oppositifolia*); *Obristii* (*marginata* x *Burseriana*); *Paulinæ* (*Ferd.-Cob.* x *Burseriana*); *Petraschii* (*marginata* x *Tombeanensis*); *pungens* (*marginata* x *juniperifolia*); *Salomoni* (*Burseriana* x *marginata*); *Stuartii* (*aretioides* x *mædia*).

SECTION *Miscopetalum.* Strong woodland plants with round leaves on long stalks whose type is our common *S. rotundifolia;* flowers corymbose, white with small purple dots; they like half-shady, cool places, well-drained leaf mould soil mixed with loam and sand. Division or seed.

S. chrysospleniifolia VI; 25 cm.; white; S. Eur.; 1, 2.
S. glandulosa IV; 40 cm.; pinkish white; Tr.; 1, 2.
S. heucherifolia V; 20 cm.; white; Cp.; 1, 2.
S. Olympica VI; 20 cm.; white; Gr.; 1, 2.

S. *repanda* IV; 25 cm.; pinkish white; S. Eur.; 1, 2.

S. *rotundifolia* IV-VI; 50 cm.; white and pink; Eur.; 1, 2.

S. *Taygetea* VI; 8 cm.; white and pink; Gr.; 1, 2.

SECTION *Nephrophyllum.* A curious group generally provided with bulbils at the base and at the axil of the flower stem; leaves kidney-shaped, lobed, or many-cleft; its type is *granulata.* Seed or bulbils.

S. *arachnoidea;* a curious plant which must be described separately: it grows in fresh grottoes of the Lago di Garda Alps and forms light yellowish masses, very thin and weblike, a cloud covering the whole plant with that yellow cobweb which protects against drought the small fleshy leaves and the little yellow flowers. Whether it is a real perennial or an annual I cannot say, as we lose it regularly every year. But on the heights of Magasa-Tombea I have seen strong plants which certainly are old ones.

S. *atlantica;* a W. Med. form of *granulata.*

S. *bulbifera* VI; 25 cm.; white; Eur.; 1.

S. *carpathica* V; 8 cm.; white; Cp., Tr.; 8, 9, 10.

S. *cernua* V; 15 cm.; whitish; Eur., Si., Ar., R. M.; 9, 10.

S. *corsica;* a Corsican dense form of *granulata.*

S. *græca;* an Oriental form of *granulata.*

S. *granulata* V-VI; 25 cm.; white; Eur., At., H.; 6, 8, 7, 10. (A garden form *fl. pl.*)

S. *irrigua* VI-VII; 25 cm.; pure white; Ca., Or.; 3, 4, 9.

S. *latepetiolata* VI; 15 cm.; white; Sp.; 6, 10.

S. *rivularis* V-VII; 10 cm.; pure white; Eur., Si., R. M.; 1, 3, 9.

S. *sibirica* IV-VI; 15 cm.; white; Ca., H., Si.; 9.

SECTION *Peltiphyllum.* Only one species, the glorious, enormous S. *peltata,* a N. W. American plant forming large masses near the Sacramento

River, the Pacific shores, and in mountain regions. It is a coarse herb; the pink flowers, in large heads on thick pink and naked 80 cm. high stems, coming before the leaves in April and May; then appear the large orbicular-peltate leaves, the whole coming from a horizontal rootstock, thick and fleshy. This plant, often named *Peltiphyllum peltatum,* likes a damp, rather light, and spongy soil and is propagated by division or seed.

SECTION *Porphyrion.* The type is the marvellous *S. oppositifolia,* one of the brightest plants in the whole alpine flora; they are prostrate, carpeting alpines for damp and north-looking walls or rocks. They have opposite foliage and relatively big flowers. Division, cuttings, or seed.

S. biflora III-IV; 5 cm.; rose or white; high Al., Py., A. R.; 8, 10.
S. blepharophylla IV; 2 cm.; carmine; E. Al.; 8, 9, 10.
S. Kochyi; a natural hybrid, *biflora* x *oppositiflora,* with big carmine flowers.
S. lilacina IV; 1 cm.; light carmine violet; H.; 4, 9, 10.
S. oppositifolia II-IV; 3 cm.; bright carmine; Eur., H., Si., A. R.; 4, 10. (Vars. *alba, grandiflora, latina, pyrenaica, speciosa.*)
S. retusa IV; 2 cm.; deep carmine; S. and E. Al., Py. 4, 6, 9, 10.
S. Rudolfiana III-IV; 3 cm.; bright carmine; E. Al.; 4, 9, 10.
S. Wulfeniana III; 2 cm.; bright carmine; E. Al.; 4, 9, 10.

SECTION *Robertsonia.* Prostrate creeping plants whose type is *S. umbrosa,* London Pride. They want half shade and a somewhat cool corner. Division or seed.

S. apennina (*Capilipes*); a narrow-leaved *cuneifolia.*

S. cuneifolia IV-V; 8 cm.; pinkish white; Eur.; 1, 2, 6, 8, 10. P. (Vars. *acanthifolia, Bucklandi, multicaulis.*)

S. Geum IV-VI; 20 cm.; light rose; Py., Sp.; 2, 4. (Shade.) (Vars. *dentata, hirsuta, Melvillei.*)

S. Manschuriensis IV; 20 cm.; pink; Ch.; 1, 2.

S. umbrosa, London Pride, IV-VII; 15 cm.; light rose; Py., Sp.; 1, 2. (Vars. *Ægylops, Colvillei, cuneata, ogilvieana, primuloides, variegata.*)

SECTION *Trachiphyllum.* The type is *S. aspera;* it belongs in the high alpine and arctic zones. Very creeping plants with masses of small racemes forming dense carpets with white or yellowish flowers. They like stony crevices, the wall, and the moraine. Seed, cuttings, or division.

S. aizoides (*autumnale*) VI-VIII; 15 cm.; yellowish red; Eur., N. Am., A. R., 3, 9. (Vars. *atrorubens, palescens,* and *virescens.*)

S. aspera IV; 5 cm.; white dotted with yellow; Eur.; 4, 10.

S. bronchialis V; 8 cm.; yellowish; Si., Can., A. R.; 3, 9.

S. bryoides IV-V; 8 cm.; white and yellow; Al., Py., Pr.; 4, 8, 10.

S. stelleriana (*Cherlerioides*) V; 8 cm.; white; A. R.; 9, 10.

S. tricuspidata VI-IX; 10 cm.; white; R. M., A. R.; 6, 9.

SECTION *Tridactylides* has only annuals.

SECTION *Trystylis.* Belongs in reality to the Euaizoonia, but, like Cesati,[52] I cannot admit that horticulturally, as the unique plant belonging to it is very distinct in all its being and aspect. It is the most strange of all the Saxifrages, and the rarest too.

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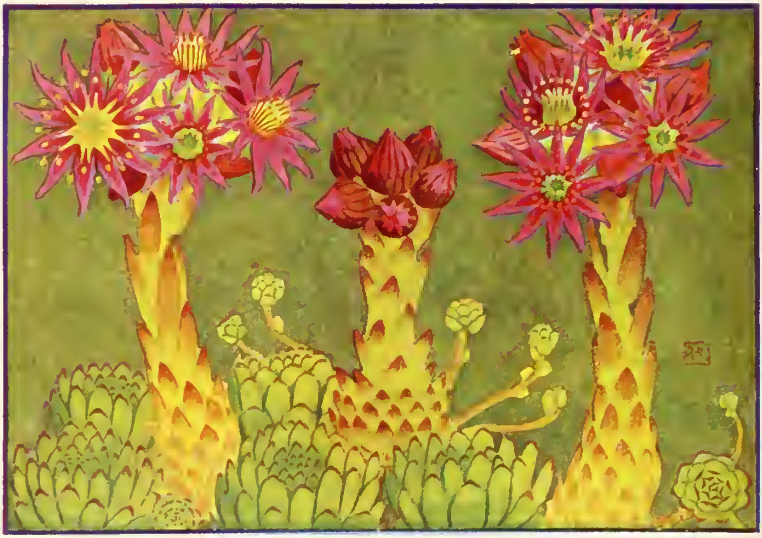
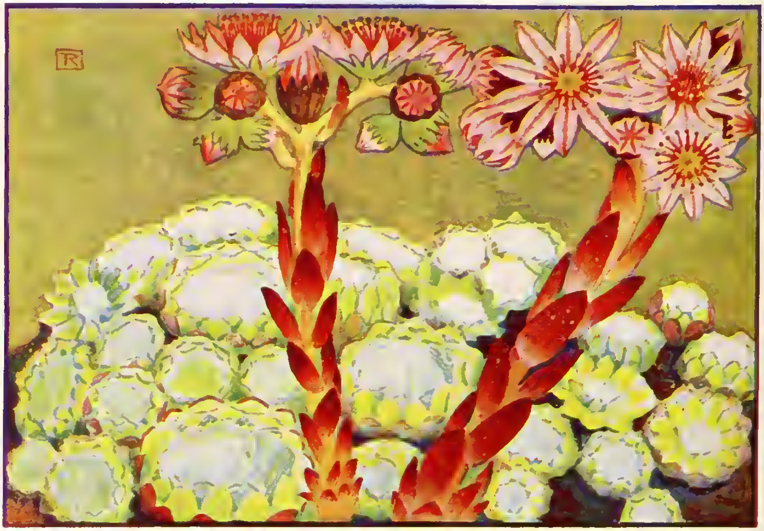
[52] Cesati, in *Atti Acad. Sc. Fis. Nat. Napoli,* IV (1869), 12.



Sempervivum montanum



Sempervivum arachnoideum

Farrer writes: "It is a tragic and splendid old species, lingering on, alone in the race, in the gaunt cold precipices of granite here and there at great elevations in a limited district of the Maritime Alps. There, in the stark red-grey walls it hangs, making a broad rosette of almost uncanny splendour, with glossy smooth leaves, quite narrow and of perfect brilliant sombre green without the least touch of beading or silver, stiff and hard and sharply ciliated at their edge, running into a point so acute that a healthy tuft is as prickly and ticklish to handle as holly or a bough of gorse." I can agree with every word of that description and I must add, that at first sight, 30 years ago, I could not believe this was a Saxifrage when I saw it adorning the sombre walls of the Lantosc Alps. It is a real monocarpian, as is *longifolia,* and can live long years without flowering; it makes large and strong rosettes, then suddenly it flowers, seeds, and dies; its splendour is over.[53] The flowers, coming in late summer (VIII-X), are of a tender pink, the shade of *S. crassifolia* or *lilacina,* and are in such abundance that it really deserves its name *florulenta;* they form a dense pyramid and are rather rare because they do not come every year. Once I could not find a single flowering plant in the whole Maritime Alps; some other years a great many were flowering. They always grow on the granitic rocks in narrow and often invisible crevices. But if you look carefully downward at the foot of the rocks you may find young seedlings coming there from the seeds which had fallen from the walls. They germinate well in the *pierriers* but cannot live long there, the conditions being uncomfortable for the plant. The culture of that beauty is on a wall, in deep and drained fissures with sphagnum moss and granitic sand. Although acid-liking, the plant flowered well in the limestone wall of Mr. Boissier at Valleyres sur Orbe (Vaud). It can be grown from seed, but take care of the young seedlings!

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[53] I once brought home and showed my friends here a dead plant of *S. florulenta* found on the *pierriers* where it had fallen; it had such an amount of dead leaves that we estimated it was at least a century old.

SCABIOSA. Scabious. These are rather meadow plants, but some are good for the rockery. The admirers—they are millions—of the magnificent frescoes of P. Robert in the Museum of Neuchâtel cannot deny the grace and the beauty of the Scabious which he has painted in such perfection in his "Rural Idyle on the Jura." These bright lilac flowers are one of the best elements of the alpine meadows (why is lilac so often taken as a mourning colour?) and they have their place not only in our Greenland or Swiss meadows but also in the rock garden. All like light, loamy ground and full sun. Seed and sometimes division.

S. arvensis (*Knautia*) VII; 50 cm.; rose lilac; Eur.; 1, 7.

S. caucasica V-XI; 80 cm.; bright lilac; Ca., Si.; 1. (A beautiful var.: *alba candidissima.*)

S. Columbaria VII-IX; lilac; Eur.; 1, 7. (Vars. *alba* and *rosea.*)

S. Correvoniana VII; 30 cm.; yellow; Ca.; 6.

S. cretica VI-IX; 50 cm.; pale blue; Med.; 1, 6. (Shrubby.)
S. Fischeri VII-X; 40 cm.; deep blue; Ch.; 1.
S. graminifolia VII; 20 cm.; bright lilac; S. Eur.; 1, 4. (A var. *splendida.*)
S. Hookeri VII; 30 cm.; pure white with blue; H.; 1.
S. Hymetia VII; 40 cm.; lilac; Gr.; 1. (Shrubby.)
S. integrifolia VII; 15 cm.; yellow; Or.; 1, 4.
S. japonica VII; 25 cm.; violet; Jap.; 1, 7.
S. lucida VI-IX; 30 cm.; violet lilac; Eur.; 1, 4, 7.
S. lyratifolia (*sicula*) VI-XI; 35 cm.; garnet red; It.; 1.
S. (*Knautia*) *magnifica* VII; 40 cm.; rose lilac; H.; 1, 7.
S. maritima VI-IX; 25 cm.; reddish lilac; Med.; 1, 7.
S. ochroleuca VIII; 60 cm.; light yellow; E. Eur.; 1, 7.
S. Olgæ VII; 40 cm.; yellow; Ca.; 1, 4.
S. (*succisa*) *pratensis* VII-X; 30 cm.; blue violet; Eur.; As.; 1, 3, 7.
S. Pterocephala. See *Pterocephalus Parnassi.*
S. pyrenaica (*vestita*) VII-IX; 25 cm.; lilac blue; Py., Sp., It.; 1, 7.
S. silenifolia VII; 20 cm.; violet; E. Eur.; 1, 4, 7.
S. suaveolens VIII; 30 cm.; light violet; Eur.; 1, 7.
S. Webbiana VIII; 20 cm.; yellowish white; Gr.; 1, 4.

SCHIVERECKIA *podolica* and *Bornmülleri.* Two Crucifers with white flowers, standing near Draba, 20-30 cm. high, flowers all the summer through; sun and dry. Seed.

SCHIZOCODON *soldanelloides.* A Japanese Diapensad called in its own country Mirror of the Mountains. That marvel is rather of difficult growth: imagine a 20 cm. high tuft of deep green reddish shining foliage, like a *Gaultheria procumbens* with bell-shaped, nodding flowers on a superb rose, flushed inside with blurs of ruby crimson! The culture of it is that of the Pyrola (see *Pyrola* *uniflora*). *S. illicifolius* and *macrophyllus* are grown in England.

SCHIZOSTYLIS *coccinea.* A nice Irid from the Cape, 30 cm. high, with terra cotta-red flowers (X-XII); a noble variety, *rosea* with delicate flesh-rose cups, blooms here in the fall. Well-drained, sheltered corner and light, sandy loam. Seed or division.

SCILLA. Must not be neglected here, though the English Bluebell is a common plant on the other side of the Channel. Throughout the lower part of England it is the glory of the spring and no word can describe its æsthetic value. We Continentals, when we see this for the first time, fall in love at once and with great pains try to introduce that beauty into our woodlands. Besides the English *S. nutans* there are many which can be recommended as rock or border plants. Seed (slow germ.).

S. amœna IV-V; 20 cm.; indigo blue; S. Eur.; 1, 7.
S. autumnalis IX-X; 15 cm.; pale violet; S. Eur.; 1, 2, 7.
S. bifolia III; 8 cm.; deep blue, white or pink; Eur.; 1, 2, 7.
S. campanulata IV; 40 cm.; blue, pink, or white; S. W. Eur.; 1, 2.
S. cernua IV-V; 40 cm.; light blue; S. Eur.; 1, 2, 7.
S. italica IV-V; 30 cm.; lilac; S. Eur.; 1', 2, 7.
S. lilio-Hyacinthus VI; 25 cm.; violet blue; S. Eur.; 1, 2.
S. nutans, Bluebell, IV-V; 15 cm.; blue, white, or pink; W. Eur.; 1, 2.
S. sibirica III-IV; 20 cm.; deep azure; Ca., Si.; 1', 7. (Vars. *alba* and *rosea.*)
S. Taurica; an Oriental deep blue *bifolia.*
S. verna V; 15 cm.; violet blue; W. Eur.; 1.

SCOLIOPUS *Bigelowii.* From the shady woods of California, an Erythronium- or Trillium-like plant with marbled leaves, setting in February and March greenish pink solitary flowers on 12-15 cm. high stems; 1, 2. Seed.

SCOLOPENDRIUM. See Hardy Ferns, Chapter ix.

SCOPOLIA. These are cousins of the Belladonna, more strange than beautiful, with 60 cm. high broadly divided stems bearing in early spring numerous bellflowers of rather lurid colour. They have some importance as medicinal plants and want leaf mould and loam; half shade. Division or seed. The following are in gardens: *S. carniolica, japonica, lurida, tangutica,* and *viridiflora.*

SCORZONERA. Salsify. The one which can be recommended is the most exquisite *S. rosea* which I found once only on a very steep cliff on the Tombea (Trentino). This was a sight I cannot forget. Imagine a large patch of the sweetest rose Dandelion-like flowers, the same tint as the Rose La France; and this forming a dense carpet framed by the dark green tufts of *Daphne rupestris.* It wants a light, sandy loam and full sun. *S. purpurea* is darker and bigger, and *S. austriaca* has yellow flowers. The very dwarf *S. pygmæa* of the alpine regions of the Atlas has silvery leaves and is good for the wall. Seed or division.

SCROPHULARIA. Offers few resources for us; they are generally stinking plants; some have red or brilliant reddish flowers. *S. coccinea* from California is the brightest of all with its brilliant red flowers recalling those of *Stachys coccinea.* The Corsican *S. trifoliata* has crimson flowers and likes a damp, sheltered place. *S. juratense, Hoopii,* and *pyrenaica* have small dark brown flowers and like the stones or grit. Seed.

SCUTELLARIA. Skullcap. These are really good rock plants whose long blooming season, their resistant nature, and nice flowers offer us real treasures for the rock garden. They are generally creeping and have their flowers in short terminal spikes. An open, warm corner of the rockery or in the wall in sun or half sun. Division or seed.

S. albida VIII; 40 cm.; light yellow; Or.; 1, 6.

S. alpina V-IX; 15 cm.; blue lilac and white; Eur.; 1, 4. (Good vars. *alba* and *versicolor.*)

S. altissima (*peregrina*) VII-IX; 60 cm.; white and blue; Or.; 1.

S. baikalensis; a dark violet *alpina* from Siberia.

S. demnatensis VIII; 10 cm.; yellow; Atlas; 4.

S. galericulata VIII; 30 cm.; dark violet; Eur.; 3.

S. japonica VIII; 20 cm.; dark violet; Jap.; 1.

S. lupulina VI-IX; 20 cm.; yellow; Sp.; 1, 4. (And var. *bicolor.*)

S. macrantha; a large-flowered *baikalensis.*

S. orientalis VII; 5 cm.; yellow and orange; Or.; 1, 4.

S. peregrina VII; 40 cm.; intense violet; Or.; 1.

S. tuberosa VII-X; dark violet; Or.; 1, 4.

SEDUM. Stonecrop. A rich genus of Crassulaceæ till quite lately very obscure so far as the amateur was concerned, nomenclature being very mixed and difficult. It was a good day for alpine gardeners when the Royal Horticultural Society of England published the precious study of Mr. Praeger which put everything in order, at least as to those species concerning the gardening world.[54] All, or almost all, are xerophile plants liking the sun and a dry situation. They hate rich soil, being always found on meagre, sandy loam; some do well on the top of a wall or on the summit of a rock. Below we enumerate the hardy kinds together with the Mexican species which need to be sheltered in winter and are marked *. Some twenty-five years ago Dr. Britton of New York and Dr. Rose of Washington made the Mexican Stonecrops a special study, and brought back a large collection of handsome and interesting species quite new to science as well as to the garden. They kindly sent me a similar collection and from my experience with those plants, coupled with that of Mr. Praeger, I am able to speak of these Mexican Sedums *"en connaissance de cause."* Easy propagation from cuttings, layers, or seed. The Sedum of the group Rhodiola have a fleshy rootstock; from these spring unbranched stout stems set with numerous leaves and bearing the blossoms in close-rounded heads. (See RHODIOLA.)

S. acre VI-IX; 8 cm.; yellow; Eur., At., Or., Si.; 1, 4, 7.
S. acutifolium VII; 10 cm.; whitish pink; S. Eur.; 1, 4.
S. adenotrichum IV-V; 10 cm.; white; H.; 4, 7.
S. Adolphi III-IV; 30 cm.; white; Mexico; 6.*
S. aizoon VI-VII; 25 cm.; yellow; Si.; 1.

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[54] *Journ. of R. H. S.,* Vol. XLVI, 1921; An Account of the genus Sedum as found in cultivation, by R. Lloyd Praeger, B.A.

S. *alamosanum* IV; 8 cm.; light rose; N. W. Mexico; 4, 6.*

S. *Alberti* VI; 10 cm.; white; E. Tu.; 4, 6.

S. *albescens;* a very pale-flowered *reflexum.*

S. *alboroseum* IX; 50 cm.; white and pink; Ch.; 1.

S. *album* VI-X; 10 cm.; white or pink; Eur., At., As.; 1, 4. (Numerous vars. *chloroticum, micranthum, murale,* etc.)

S. *algidum* VI-VIII; 15 cm.; rose; Si.; 1. (Rhodiola group.)

S. *allantoides* VIII; 15 cm.; greenish white; Mexico; 4, 6.*

S. *alpestre* (*repens*) VI-IX; 5 cm.; yellow; W. Al., Py., 4, 6.

S. *alsinæfolium* VII-IX; 5 cm.; white; S. Eur.; 6, 10. (Biennial.)

S. *altissimum* VI-IX; 25 cm.; pale yellow; S. Eur.; 1, 4.

S. *amplexicaule* V-VI; 5 cm.; pinkish white; S. Eur.; 4, 6.

S. *Anacampseros* VI-VIII; 20 cm.; bluish white; Al. 1, 4. P.

S. *anglicum* V-VI; 5 cm.; white; W. Eur.; 4, 6.

S. *anopetalum* (*montanum, ochroleucum*) VII; pale yellow; S. Eur.; 1, 4.

S. *asiaticum* (*crassipes*) VII; 20 cm.; light rose; H.; 1, 6. (Rhodiola group.)

S. *Athoum;* a greenish, short-leaved *album.*

S. *atrosanguineum; S. Fabaria* with dark red leaves.

S. *bellum* (*farinosum*) III-IV; 10 cm.; white; Mexico; 6.*

S. *Beyrichianum* VI-VII; 20 cm.; white; N. Am.; 1, 4.

S. *bithynicum* VII; 10 cm.; white; Or.; 4. (Var. of *album.*)

S. *Bourgæi* VI-VII; 20 cm.; whitish red; Cent. Mexico; 6.*

S. *brevifolium* VII-IX; 3 cm.; light pink; Py. Co.; 4. (A var. *Potsii* has farinose leaves.)

S. *bupleuroides* VI-VII; 20 cm.; red purple; H.; 1. (Rhodiola group.)

S. *cæruleum* VII; 8 cm.; azure; Co., At.; 6. (Biennial.)

S. *callichroum* V; 8 cm.; light rose; Or.; 6, 8, 10.

S. *carpathicum* VII-VIII; 20 cm.; whitish; Cp.; 1. (Telephium group.)

S. *Chauveaudi* VIII-X; 15 cm.; yellow; Y.; 6, 10.

S. *Cocquerellii* VIII; 5 cm.; white; New Mexico; 6, 8.

S. *compactum* VII; 2 cm.; yellow; Mexico; 4, 6.*

S. corsicum (*dasiphyllum* var. *glandulosum*) VII; 5 cm.; white; S. Eur.; 4.
S. crenulatum VII; 15 cm.; purple; H.; 1, 6. (Rhodiola group.)
S. creticum VII; 10 cm.; pink; Crete; 4, 6. (Biennial.)
S. crista-galli; a cockscomb-leaved *rupestre.*
S. cupressoides VIII; 10 cm.; light rose; Mexico; 4, 6.*
S. cyaneum VI; 10 cm.; light rose; Si.; 4, 6.
S. dasiphyllum VI-VIII; 5 cm.; pinkish white; Eur., At.; 4. L.
S. debile VI; 10 cm.; yellow; garden origin; 4, 6.
S. dendroideum IV-VII; 40 cm.; bright yellow; Mexico; 1.*
S. divergens VIII; 15 cm.; yellow; R. M.; 4, 6.
S. diversifolium V-VII; 5 cm.; yellow; Mexico; 4, 6.*
S. Douglasii VII-IX; 20 cm.; yellow; R. M.; 1, 4.
S. dumulosum (*Farreri*) VI; 20 cm.; white; Ch.; 1. (Rhodiola group.)
S. Ellacombianum VII-IX; 15 cm.; light yellow; Jap.; 1.
S. elongatum VI; 40 cm.; purple; H.; 1, 6. (Rhodiola group.)
S. eriocarpum VI-IX; 10 cm.; whitish; Or.; 1, 4.
S. Eversii VIII-IX; 15 cm.; rose; Si.; 1, 4.
S. Fabaria VIII-X; 50 cm.; rose; Eur.; 1, 4.
S. fastigiatum V-VII; 15 cm.; white; H., Y.; 1, 4, 6. (Rhodiola group.)
S. frutescens VII-IX; 30 cm.; white; Mexico; 6.*
S. gelidum VII; 10 cm.; yellow; H.; 1, 4, 6. (Rhodiola group.)
S. (*Sedastrum*) *glabrum* VIII; 25 cm.; white and purple; Mexico; 6.*
S. glaucum VI-IX; 8 cm.; white; S. Eur.; 1, 4, 6.
S. gracile VI-VII; 10 cm.; white; Ca., Or.; 1, 4.
S. Gregii VII; 15 cm.; yellow; Mexico; 6.*
S. Griffithii VII; 20 cm.; whitish pink; 4, 6.
S. griseum II-III; 15 cm.; white; Mexico; 4, 6.*
S. guadalajaranum VI-VII; 15 cm.; greenish white; Mexico; 6.*
S. gypsocolum VI-VII; 12 cm.; white; Sp.; 1, 4.
S. Hæmatodes VIII; 30 cm.; pinkish white; N. Am.; 1, 6.

S. Hallii VI-VII; 5 cm.; bright yellow; Cal.; 4, 6.

S. (*Sedastrum*) *Hemsleanum* VI; 25 cm.; white; Mexico; 6.*

S. heterodontum VII; 5 cm.; whitish; H.; 1, 6.

S. Himalayense V-VI; 20 cm.; dark purple; H. (4-5000 m. alt.); 6.

S. hirsutum VI-VII; 8 cm.; whitish pink; S. W. Eur.; 4, 6, 9, 10; P.

S. hispanicum VII; 5 cm.; whitish; S. Eur.; 1, 4, 7.

S. humifusum VII; 2 cm.; yellowish; Mexico; 4, 6.*

S. indicum IX-X; 20 cm.; white and crimson; H., Ch.; 6. (Biennial.)

S. japonicum VII; 12 cm.; yellow; Ch., Jap.; 4, 6.

S. Kamschaticum VII-IX; 30 cm.; bright yellow; Si.; 1, 4. (A var. *fol. var.*)

S. (*Rhodiola*) *Kyrilowii* VII; 20 cm.; red; Tu.; 1, 6.

S. laconicum VI-VIII; 5 cm.; yellow; Or.; 1, 4. (Acre group.)

S. Lampusæ VII; 30 cm.; pink; Cyprus; 6. (Biennial.)

S. latifolium; an Italian form of *maximum.*

S. Liebmannianum VII-VIII; 8 cm.; yellow; Mexico; 4, 6.*

S. linearifolium VII; 10 cm.; white; H.; 1, 4, 6. (Rhodiola group.)

S. Listoniæ VII-IX; 15 cm.; pink; Or.; 1, 4. (Spurium group.)

S. longipes VIII; 10 cm.; bright yellow; Mexico; 4, 6.*

S. Lydium VII-VIII; 8 cm.; light rose; Or.; 1, 4.

S. magellense (*Olympicum*) VII-IX; 10 cm.; whitish; Ap., E. Eur.; 1, 4.

S. Maximowiczii. See *aizoon.*

S. maximum VII-IX; 60 cm.; yellowish; S. Eur.; 1, 4.

S. mellitulem VIII; 8 cm.; pale yellow; Mexico; 4, 6.*

S. micranthum; S. Eur. dwarf form of *album.*

S. Middendorfianum VII; 15 cm.; yellow; Si.; 1, 4, 6.

S. Monregalense (*cruciatum*) VIII; 10 cm.; white; S. Eur.; 4, 6.

S. moranense VII; 8 cm.; white; Mexico; 4, 6.*

S. multiceps VIII; 10 cm.; white; As.; 4, 6.

S. Nevii V-VII; 15 cm.; white; R. M., Can.; 4, 6.

S. nicæense VI-VII; 25 cm.; clear yellow; S. Eur.; 1, 4.
S. oaxacanum VII; 10 cm.; yellow; Mexico; 6.*
S. obtusatum VII; 8 cm.; yellow; R. M.; 4, 6.
S. obtusifolium VII; 8 cm.; white; Ca.; 1. (Spurium group.)
S. oreganum VII; 10 cm.; yellow; N. W. Am.; 1, 4.
S. oxypetalum VII; 20 cm.; bright yellow; Mexico; 1, 6.*
S. pachyphyllum IV; 20 cm.; rose; Mexico; 1, 6.*
S. Palmeri II-IV; 25 cm.; bright yellow; Mexico; 6.*
S. pilosum V; 5 cm.; rose; Ca.; 6. (Biennial.)
S. populifolium VI-IX; 30 cm.; light rose; Si.; 1, 6.
S. potosinum VII; 10 cm.; yellowish; Mexico; 6.*
S. Prægerianum VII; 8 cm.; rose; Tibet; 6.
S. primuloides VIII; 15 cm.; white; Y.; 6.
S. proponticum (*gemmiferum*) VII; 10 cm.; rosy purple; Or.; 4.*
S. pruinatum (*elegans*) VII; 20 cm.; yellow; Sc.; 1, 4.
S. pulchellum VII; 10 cm.; lilac rose; S. E. Am.; 6.*
S. purpureo-viride V; 20 cm.; purplish; Y.; 1, 6. (Rhodiola group.)
S. purpureum; a *Telephium* with purplish red flowers.
S. quadrifidum VII; 10 cm.; yellow; Si.; 4, 6. (Rhodiola group.)
S. rariflorum V; 15 cm.; white; Ch.; 1, 6. (Rhodiola group.)
S. reflexum (*rupestre*) VI-IX; 15 cm.; yellow; Eur., Or.; 1, 4.
S. retusum VI-VII; 30 cm.; white and pink; Mexico; 6.*
S. rhodanthum VI; 25 cm.; rose; R. M.; 1, 6. (Rhodiola group.)
S. Rhodiola. See *Rhodiola rosea.*
S. rhodocarpum VIII; 20 cm.; yellow; Mexico; 1, 6.*
S. rivulare (*Sundermanni*) VII; 10 cm.; light rose; Sp.; 4.
S. rotundatum VI; 15 cm.; pinkish red; Y.; 1, 6. (Rhodiola group.)
S. sarmentosum VI-VII; 10 cm.; yellow; Si., Ch.; 1, 4.
S. Selskianum VII; 40 cm.; yellow; Si.; 1, 6.
S. (*Umbilicus*) *Semenowii* VII; 30 cm.; white and pink; Tu.; 1, 6.

S. (*Cotyledon*) *sempervivoides* (*S. sempervivum*) VII; 15 cm.; bright crimson; Ca.; 4, 6.

S. *sexangulare* (*boloniense*) VI; 5 cm.; yellow; S. Eur.; 1, 4. (Acre group.)

S. *Sieboldi* VIII-X; 10 cm.; rose; Jap.; 1, 6. (A var. *fol. var.*)

S. *spathulifolium* VII-IX; 10 cm.; yellow; R. M., Can.; 1, 4, 6. (A var. *purpureum* with red foliage.)

S. *spectabile* IX-X; 50 cm.; pink; Jap.; 1. (A var. *atropurpureum.*)

S. *spurium* VII-IX; 15 cm.; violet rose; Ca.; 1, 4. (Vars. *album* and *splendens.*)

S. *Stahlii* VII; 10 cm.; yellow; Mexico; 4, 6.*

S. *stenopetalum* VII; 10 cm.; yellow; R. M.; 4, 6.

S. *stoloniferum* (*ibericum*) VI-VIII; 8 cm.; flesh rose; Ca.; 1, 4. (Spurium group.)

S. *Telephium* VII-X; 60 cm.; greenish rose; S. Eur.; 1, 4.

S. *tenellum* VII; 8 cm.; pinkish; Or.; 1, 4, 6.

S. *ternatum* VI; 10 cm.; white; R. M., Can.; 1, 4, 6.

S. *Tibeticum* VI-VII; 20 cm.; dark purple; Tibet; 6.

S. *Treleasi* IV; 25 cm.; yellow; Mexico; 6.*

S. *trifidum* VII; 10 cm.; white; H.; 4, 6.

S. *trulipetalum* IX; 10 cm.; pale pink; Y.; 6.

S. *variicolor* VIII-IX; deep yellow; Y.; 4, 6.

S. *versadense* VI; 15 cm.; white and rose; Mexico; 6.*

S. *verticillatum* IX; 40 cm.; greenish; Jap.; 1. (Telephium group.)

S. *Wrightii* IX-X; 8 cm.; white; S. W. N. Am.; 4, 6.

S. *Yosomitense* V; 10 cm.; bright yellow; Cal.; 4, 6.

S. *Yunnanense* (*valerianoides*) VII; 30 cm.; purplish; Y.; 1, 6. (Very polymorphic.)

SELAGINELLA. Small dwarf Mosses, creeping upon the ground in cool corners in the mountains; they are serviceable for carpeting the soil; all are bright green and absolutely dwarf, save in one case. *S. Douglasi* and *rupestris* are from North

America; *S. denticulata, Helvetica,* and *spinulosa* are European. A very curious half shrubby Selaginella is the one exception just mentioned; we got it at Floraire in 1905 under the name Wildenowii, which is incorrect, and identified it as *S. caulescens;* it is 15-20 cm. high, very elegant and quite hardy. Shade and peaty leaf mould.

SELLIERA *radicans* (*Goodenia repens*). A rare but very troublesome and invading plant from Tasmania with little white and blue flowers; it is a rapid-growing, carpeting kind, good for bog and moist soils. In damp and mild countries it can be used for the paved walk, being not more than 5 cm. high.

SEMPERVIVUM. Houseleek. Hen-and-Chickens. Belong in the Crassulaceæ and forming a large genus, rather homogenous and minutely differentiated. The greatest confusion reigns in them and, when I published my study on the genus,[55] I had the greatest difficulty in bringing order to their synonomy, and still I am far from having made it clear, although I worked on the Sempervivums from 1884. My collection was begun at Plainpalais in the alpine garden I had there. No botanist has made a serious study of them, save Dr. Jordan of Lyon, who divided them very minutely and said he grew in his personal botanic garden more than 6000 different forms. Another French botanist, Dr.

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[55] For description of all Sempervivum known to this day, see H. Correvon, *Les Joubarbes, étude du genre Sempervivum,* Bruxelles, 1924.

Rouy, confused rather than clarified the matter.[56] These plants are sold to gardens under a great many names and we urgently need a serious monograph of the genus. Many botanists have begun to do this, but, unfortunately, none of them carried the work to a conclusion. The genus must be studied in living specimens, as dry they lose some of their principal characters. I, at four different times, gave to four different botanists an entire collection of what I had collected since 1884, but none of them did anything. At last, after many ineffectual efforts to encourage one or another of these men, I published my own observations in 1924. I made an interesting discovery as to the origin of the wrong name *S. californicum* which exists in many nurseries and botanic gardens. As all the Sempervivums belong to the Old World and none have ever been found in America, I thought this was an alteration of the name *calcareum,* and it was really so: about 1860 the famous Van Houtte nursery in Ghent, Belgium, sent to Froebel in Zürich *S. calcareum* named *californicum* and since then that South European plant has been attributed to California. I found the incorrect name on a tuft of *S. calcareum* in a botanic garden near the hospital at Washington, D. C.![57]

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[56] Dr. G. Rouy, *Flore de France,* Vol. VII.

[57] See H. Correvon, "Erroneous Names in Nurseries," *Gard. Chron.,* 3, VI, 1914. The little study on the Houseleeks I published there does not pretend to resolve the problem of Sempervivum nomenclature; it is only a kind of prodromus to clear the ground!

There are a great number of hybrids and varieties, and our collection at Floraire, made with their study as the special point of view, has nearly 300 types. We have them in a large, well-drained bed exposed to the full sun, in a common sandy loam, mixed with lime for the lime-loving ones, or with granitic sand for those which want acid soil. All, save some of the high alpines of the Arachnoideæ and Pubescentiæ groups, are of very easy cultivation and need only a healthy, well-drained ground and full sun. They are, as their names would indicate, "sempervivant" and it is difficult to kill them. Farrer said: "They are all of the easiest culture and of the loveliest effect, at least so far as their carpet and masses of rosettes go,—green, blue, violet, ruby; or all shades commingled; or cobwebbed till they are like ping-pong balls in cotton wool."

The composition of the soil can affect them greatly. I saw at Middleton House some magnificent large and tall Sempervivums which I could hardly identify. They were just like the big Mexican *Echeveria metallica* or *glauca* and have large rosettes reaching more than 12 cm. diameter. "What is the reason," I asked the master of the house, Mr. Bowles. "Good and rich, well-drained limestone," was the answer. In such conditions these plants had lost their natural character and were nice garden ornaments. I never give them the slightest manure at Floraire but take care that they do not suffer from damp. Reproduction by division or from seed. (See color plate facing p. 454.)

There are two big classes of Sempervivum: the *Eusempervivum* with the flowers divided in 10 to 20 parts; and the *Diapogon* having flowers divided in 6 parts. Then the first class is again divided in 4 groups:

I. CILIATA. With the leaves of barren rosettes fringed at the edges only; they are of green, glaucous blue, sometimes reddish violet tints, with or without a red tip. These are the easiest of all for cultivation, wanting only a sunny and dry situation on a stony, well-drained ground (type, *tectorum*).

II. PUBESCENTIA. Leaves of the barren rosettes downy on the surface, covered with glandulous short hairs or glands; rosettes small, stoloniferous; flowers reddish or pink. Generally lime-haters; wall or perpendicular position on the rockery; they fear moisture but like a cool, well-lit corner (type, *montanum*).

III. FIMBRIATUM (*barbulatæ*). Leaves downy and fringed, and tipped with a tuft of hairs; small rosettes. They want the rockery or a wall; if on flat ground, a well-drained soil, stony and sunny, is necessary (type, *Funkii*).

IV. ARACHNOIDEUM. Dense masses of small rosettes with the leaves all interwebbed with more or less cottony cobweb from tip to tip. Generally lime-haters, wanting a very sunny, exposed spot on the rockery, light soil and well-drained corner;

best of all a perpendicular crevice or a wall (type, *arachnoideum*).

The first group (CILIATA) offers the greatest collection for the garden; some have red or pink and others yellow flowers. In the section of the red flowers, we have: *S. atropurpureum, atrorubens, atroviolaceum, cupreum, elegans, nigrum, purpurescens, rubens, triste,* with more or less reddish foliage. *S. acuminatum, arvernense, Aureggi, bicolor, blandum, calcaratum, calcareum, decorum, juratense, Laharpei, lesurinum, murale, Murithii, parvulum, præstabile, pulchrum, pyrenaicum, robustum, Royanum, rubrum, Schnittspahni, spinulifolium, tectorum, violascens,* with more or less glaucous-green leaves, dark brown tips, and red or rosy-rose flowers. *S. alpinum, ambiguum, assimile, atlanticum,* Boissieri, Boutignianum, cantabricum, decoloratum, glaucum, lætevirens, Lamotteanum, Mettenianum, palescens, Rhodanicum, rupestre, sabaudum, Schlehani, Schottii, venustum,* with monochrome green leaves; *S. ornatum* and *Piedoyanum,* with their leaves red at the base and green at the top.

The yellow-flowering kinds of this group (Chrysanthæ) are: *albidum,* with large deep red rosettes, very short-haired and yellowish-white flowers; *armenum,* big rosettes of ciliate gay-green leaves; *Brownii,* middle-sized bright green rosettes, imbricate and recurved leaves, sulphur-yellow flowers; *ciliatum,* middle-sized rosettes strongly ciliate, pale yellow flowers; *Gaudini* (*grandiflorum*) pubescent, glandulose, aromatic, middle-sized deep green rosettes, red tipped; flowers large and brilliant sulphur yellow; this is a roof and wall plant from N. W. It. Al.; *globiferum,* with large globular rosettes and incurved leaves; *leucanthum,* a Balkan yellowish-white-flowered *tectorum; Pittonii* is a diminutive *Gaudini* from the Styrian Alps; *rupicolum,* with greyish-green leaves, pubescent beneath; *Ruthenicum,* large deep green rosettes, long and strong stolons; *Wulfeni,* from the Engadine and E. Alps, with glaucous foliage, purple at the base; *Zelebori,* a Balkan form of *Ruthenicum.*

In the second group (PUBESCENTIA) we have *S. alpestre,* which differs from *montanum* by its leaves, bright green instead of greyish green, and by its longer and narrower petals; *Burnati,* a large *montanum* found in the Maritime Alps; *Caucasicum,* with leaves bluntly straightened in points and ciliate; *dolomiticum,* with small incurved rosettes, differing from *montanum* by its strong and dry hairs and from *Funkii* by its longer leaves and brown red flowers; *flagelliforme,* with intense green rosettes and the stolons often 20 cm. long, flowers rose brown; *frigidum,* a big *montanum* with 3-4 cm. diameter rosettes forming large tufts 20-25 cm. broad, very hairy glandulous, flowers pale rose; *montanum* is the commonest of our high granitic Alps: rosettes 1½-2 cm. diam., grey green or brownish, very glandulose, flowers 3-4 cm. diameter, brownish rose; *stenopetalum,* with bright green leaves, reddish tipped, and light rose and whitish flower.

The third group (FIMBRIATUM) is a small one. The leaves are fringed and tipped with a tuft of hairs; they belong chiefly to the Oriental Alps: *S. angustifolium,* with narrow leaves edged with long dry hairs, and shorter ones glandulous, large bright carmine flowers; *Chavini,* with brownish leaves, white hairs at the top of the leaves and rose flowers; *Fauconnetti,* a very curious species with medium-sized rosettes, strongly ciliate, bearing some spidery filaments at the top of the leaves and large bright rose flowers; *Funkii,* with bright green leaves narrowly ovate, ciliate with single hairs and bearing underneath some short glandulose hairs, flowers bright pink; *pilosellum* is a reduced form of *Fauconnetti; rubicundum* has bright red rosettes and purple rose flowers.

The fourth group (ARACHNOIDEÆ) is the most alpine of all: *S. arachnoideum* with masses of neat woolly white balls and among them the rising stem of 12-15 cm. and the twelve-rayed stars in the most glowing shade of ruby rose, shining on the hot banks of the Alps. It does much better in peat than on chalk and likes hot, dry, sunny situations, fearing the wet winters above all; a very variable plant and many varieties have been published too: *S. barbulatum* (*piliferum*) is perhaps a hybrid, *montanum* x *arachnoideum.* It is stoloniferous, has thinner hairs, never spidery, and larger flower than *arachnoideum; S. bryoides,* a minute plant with silvery tomentose rosettes, tinted with scarlet; *Dœllianum* differs from *arachnoideum* by its looser rosettes, distinctly less cobwebbed, and its duller pink flowers; *fimbriatum,* with light rose flowers; *heterotrichum,* dwarfer than *arachnoideum,* bearing very long and intricate hairs and, at the top of the leaves, tufts of hairs; *Hookeri* is a very thickly and white-cobwebbed form of *arachnoideum; Laggeri* has the rosette very dense and compact, flattened, the outer leaves being reddish purple and the central ones green, the whole being covered with a thick, cobwebbed texture; *Moggridgei* differs from *arachnoideum* by its shorter leaves forming a round ball covered with a thick cobweb; *sanguineum* is a very bright pink-flowering *arachnoideum; tomentosum* (*Webbianum*) is a stronger *arachnoideum* from the Southern Alps with such a thick woolly down that the leaves are entirely covered with it; flowers brighter and larger.

The DIAPOGON class with erected yellow flowering divisions is more limited, offering about ten species: *Allionii,* with bright yellowish green, pubescent glandulous foliage and light yellow flowers; *arenarium,* dwarf and cæspitose plant, has its young offsets rolled up in round balls falling over the ground, cream yellow flowers; *Heuffelii* is a form of *patens* with light yellow flowers; *Hillebrandti* is a *Neilreichii* with larger leaves and the yellow petals more finely laciniate and very hairy; *hirtum* is the type of this class, covering some large spaces and slopes in America, the E. Pyr., the It. and Austrian Alps, and is one of the most popular in the garden. Rosettes 8 cm. broad, reddish green, the young ones being loose and going away from home like the prodigal son and covering the soil all about, flowers light yellow; *Kopaonikense* is a large *Reginæ-Amaliæ; Neilreichii* is near to *arenarium* but has hairy petals; *patens* has large rosettes, strongly ciliate and yellow linear petals, broader at their top; *Reginæ-Amaliæ* has flat blue-green rosettes with pink and yellow flowers, petals shorter and broader than the sepals; *soboliferum* is a diminutive hirtum giving a mass of small rosettes which, being loosened from their mother, go forth into the world and cover the ground all around.

There are numerous hybrids, the most important being: *Comolii* (*Wulfeni* x *tectorum*); *Fontanæ* (*Dœllianum* x *tectorum*); *Huteri* (*montanum* x *Wulfeni*); *Pomelii* (*arvernense* x *arachnoideum*); *rhæticum* (*montanum* x *alpinum*); *Theobaldi* (*Wulfeni* x *montanum*); *Thomayeri* (*hirtum* x *arachnoideum*); *Thomsoni* (*arachnoideum* x *tectorum*); *Vaccarii* (*Gaudini* x *arachnoideum*); *Ventosicolum* (*montanum* x *tectorum*).

The Sempervivums of the hirtum group whose little balls fall down about the mother plant (hence the popular name Hen-and-Chickens) can be used for enlivening the roof of verandahs or porches which are covered with sand or grit, to protect them against heat. A friend had a pot of

S. soboliferum on a window located just above such a roof; some of the small balls fell upon the roof and, two years later, the whole roof was carpeted by the thick-growing Sempervivums which now entirely cover the meagre soil, adorning the roof and cooling the verandah.

SENECILLIS. See SENECIO *carpathica.*

SENECIO. Groundsel. An important and very large group of Composites growing all over the world. The high mountain kinds are generally dense creepers with greyish downy leaves (*S. Boissieri, carniolicus, Fendleri, incanus, leucophyllus, tomentosus, trifurcatus, uniflorus,* and *Websteri*), or dwarf bushy with bright green deeply cut leaves (*S. abrotanifolius, adonidifolius, Tyrolensis*); some others are low bushes with entire leaves (*S. aurantiacus, campestris, carpathicus, Doronicum*); but the generality of them are big herbaceous plants with large leaves and noble proportions (*S. aconitifolius, clivorum, cordatus, Doria, japonicus, Jacquinianus, Othonæ,* etc.); others, like the Maritime Groundsel, have very downy cut leaves and are like dwarf shrubs; others (*S. scandens*) are climbing. This is a very polymorphic and widely disseminated genus. In cultivation the creeping downy alpines want special care; the others ask only a well-drained soil, and generally sunny situation. All can be reproduced from seed, some from cuttings, division, or layers.

S. abrotanifolius V-VII; 25 cm.; orange red; Al.; 1, 6.
S. (*Syneilesis*) *aconitifolius* VII; 50 cm.; yellow; Jap.; 1, 6.

S. adenostyloides VII; 80 cm.; yellow; Jap.; 1, 2.

S. adonidifolius (*artemisiæfolius*) VI; 20 cm.; bright yellow; Py.; 1, 4.

S. Ætnensis VII; 20 cm.; yellow; Sicily; 1, 6.

S. alpestris VII; 50 cm.; yellow; E. Al.; 1.

S. alpinus (*cordifolius*) VI; 70 cm.; bright yellow; Eur.; 1.

S. (*Cineraria*) *aurantiacus* V; 15 cm.; bright orange; Al., Si.; 6.

S. Boissieri V; 5 cm.; yellow; Sp.; 4, 6, 9.

S. (*Cineraria*) *campestris* V; 20 cm.; yellow; Eur., As.; 1, 6.

S. candidus VIII; 20 cm.; yellow; Sicily; 1, 4.*

S. carniolicus VI; 8 cm.; yellow; E. Al., Cp.; 6, 8, 9.

S. (*Senecilis*) *carpathicus* VII; 1 m.; yellow; Cp.; 1.

S. chrysanthemoides VII; 30 cm.; yellow; H.; 1.

S. Cineraria (*Cineraria maritima*) VI-X; bright yellow; Med.; 1, 4.

S. clivorum IX-X; 1.50 m.; bright yellow; Ch., Jap.; 1, 3.

S. cordatus VIII; 80 cm.; yellow; Eur.; 1.

S. Correvonianus VII; 40 cm.; yellow; Ca.; 6.

S. Doria (*macrophyllus*) VIII-X; 1 m.; yellow; Eur., Ca., Si.; 1, 3.

S. Doronicum VI; 30 cm.; bright yellow; Eur.; 6.

S. Douglasi VIII; 80 cm.; yellow; R. M.; 1, 6.

S. erraticus VII; 1 m.; yellow; S. Eur.; 1.

S. erubescens VII; bright orange yellow; Ba.; 6.

S. erucifolius VIII; 80 cm.; yellow; Eur.; 1.

S. farfaræfolius VI; 25 cm.; yellow; Taurus; 6.

S. Fendleri VI; 5 cm.; yellow; R. M.; 4.

S. Fuchsii VIII-X; 1 m.; yellow; Eur.; 1, 2.

S. Greyi; a robust shrub from N. Z. with yellow flowers; 1.*

S. incanus V; 5 cm.; yellow; Al., Py., Cp.; 4, 6, 9.

S. Jacobæa VIII; 60 cm.; yellow; Eur.; 1, 3, 7.

S. Jacquinianus (*nemorensis*) IX-X; 1 m.; bright yellow; Eur.; 1.

S. Kæmpferi VIII; 80 cm.; yellow; Jap.; 1.

S. leucophyllus VII; 10 cm.; bright yellow; Py.; 4, 9, 10. L.

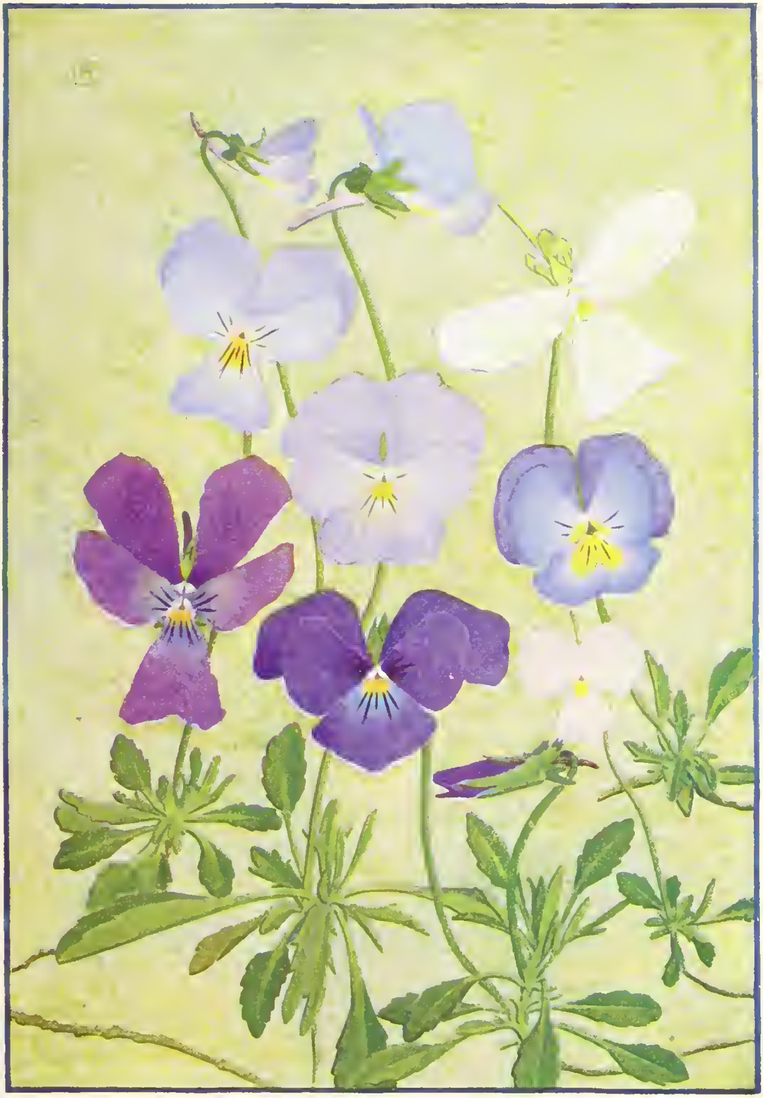
S. *Ligularia.* See *Ligularia.*
S. *Othonæ* VIII; 1 m.; yellow; Ba., Ca., Or.; 1.
S. (*Erythrochæte*) *palmatifidus* VIII; 1 m.; yellow; Jap.; 1, 2.
S. *palustris* IX; 1 m.; yellow; Eur.; 1, 3.
S. *Przewaldskyi* IX-XI; 80 cm.; bright yellow; Ch.; 1, 2.
S. *pulcher* IX-XI; 40 cm.; bright carmine violet; S. Am.; 1.*
S. *sagittifolius* IX; 2 m.; cream white; S. Am.; 1.
S. *scandens* VIII-IX; climbing; yellow; H.; 1.*
S. *spathulifolius* V; 80 cm.; yellow; Eur.; 1, 3.
S. *Tanguticus* IX; 80 cm.; yellow; Ch.; 1, 3.
S. *Tournefortii* VIII; 60 cm.; yellow; Py., Sp.; 1, 4, 6.
S. *tyrolensis* VI; 10 cm.; bright orange red; E. Al.; 6.
S. *uniflorus* V; 5 cm.; yellow; high Al.; 4, 6, 10. P.
S. *Veitchianus* VIII; 1 m.; yellow; Ch.; 1.
S. *Wilsonianus* IX; 1.50 m.; yellow; Ch.; 1.

SERRATULA *nudicaulis.* Rare Composite with bright carmine heads on 30 cm. high leafless stems which grows in the limestone Southern Alps and wants full sun. *S. atriplicifolia, coronata,* and *Vulpii* are sometimes grown in gardens; sun. Seed.

SESELI. Low and cæspitose Umbellifers with grey bluish finely divided foliage and white Carrot-like flowers. They want a deep, meagre soil, a sunny exposure. Seed (slow germ.). We grow here *S. cæspitosum, glaucum,* and *gummiferum.*

SHEFFIELDIA *repens.* Creeping primulaceous plant from the N. Z. Alps near to Samolus with bright green foliage and white flowers in spikes; blooming VI-IX, and never higher than 5-8 cm.; culture 9, 10. Seed.

SHORTIA *galacifolia.* From Japan; one of the most exquisite plants for peaty ground but rather difficult in limestone. It is a woodland plant with wide



Viola calcarata

tufts of evergreen, shining, bright green, or brownish leaves, shaped like *Pyrola rotundifolia;* the Soldanella-like flowers are relatively large, pearl-pale bells blooming IV-VI on slender 10 cm. high pink stems; it likes a cool, rich, well-drained spot and pure peat; shade or half shade. *S. uniflora,* its North American brother, is smaller with thinner leaves and large flowers of a delicate pink-pearl colour. Same cultivation. They can be divided or increased by suckers, but this is rather difficult. The seeds are very thin and must be sown in turfy peat with granitic sand.

SIBBALDIA *procumbens.* Small inconspicuous plant with glaucous foliage and little yellow-greenish flowers growing on the acid alpine districts of Europe or of the boreal regions. *S. maxima,* from the Caucasus, is somewhat larger. Both are strictly lime-fearing. Seed.

SIDALCEA. Tall mallow-flowers from Northwestern America with spikes of flowers, white in *S. candida,* pink in *S. hirsuta, malvæflora, Oregana,* and *spicata;* good light soil, sunny situation. Seed or division.

SIDERITTIS. South European Labiate with generally greyish velvety foliage and yellowish flowers in spikes; very rich in honey and so good for bees; generally dwarf shrubs not exceeding 20-30 cm.; sun and dry situation. Seed or division. *S. condensata* from Or.; *Eubea* from Greece, *hyssopifolia* from South Europe; *Lebanotica* from Lebanon; *spinosa* and *taurica* from the Orient.

SIEVERSIA. See GEUM.

SILENE. A vast genus comprising a large number of annuals and of unworthy plants and some very useful and showy ones, especially in the group of rock plants. It has long been divided into three different genera by some botanists (HELIOSPERMA, MELANDRIUM, and SILENE) but we do maintain the old nomenclature. The alpine and arctic ones are dense creeping plants, while those growing in low lands are loose herbaceous. All can be grown from seed, and propagated by cuttings or division.

S. *acaulis* IV-V; 2 cm.; bright pink; Al. Eur., B. R.; 4, 6, 9, 10. (Vars. *alba* and *grandiflora*.)

S. (*Heliosperma*) *alpestris* IV-IX; 10 cm.; pure white; E. Al.; 1, 4, 6. (Vars. *fl. pl., grandiflora,* and *rosea*.)

S. *alpina* VI-IX; 1'5 cm.; whitish rose; Al., Py.; 1, 4.

S. *aprica* VI; 20 cm.; rose; Ch.; 1.

S. *argæa* VI; 4 cm.; white; Or.; 6.

S. *Armeria* and *Arm. grandiflora;* annuals with bright pink flowers.

S. *Asterias* and *Ast. grandiflora;* annuals with bright red flowers.

S. *Boryi* V; 15 cm.; pale pink; Sp.; 4, 6.

S. *bryoides* (*elongata*) V; 8 cm.; bright pink; Al.; 4, 6.

S. *cæspitosa* VII; 20 cm.; light rose; Ca.; 1, 4.

S. *californica* V; 25 cm.; bright scarlet; Cal.; 1, 6.

S. *Campanula* V; 10 cm.; light rose; M. Al.; 4.

S. *caucasica* VI; 8 cm.; whitish red.; Ca.; 1, 4.

S. *ciliata* IV-V; 10 cm.; reddish white; Py., Sp.; 1, 4, 6.

S. *cordifolia* IV-VI; 5 cm.; light pink; M. Al.; 4, 6.

S. *Correvoniana;* a double-flowering *bryoides.*

S. *dianthoides* VI; 15 cm.; pink; Ca.; 1, 6.

S. (*Melandrium*) *Elisabethæ* IV-VII; 10 cm.; bright carmine; E. Al.; 4, 6.

S. (*Heliosperma*) *eriophorum* IV; 8 cm.; white; E. Al.; 1, 4, 6.
S. exscapa; a quite stemless *acaulis,* with pink or white flowers.
S. fimbriata VI; 70 cm.; white; Ca.; 1.
S. Fortunei IX; 50 cm.; rose; Ch.; 1.
S. Hookeri VI; 5 cm.; light pink; R. M.; 4, 6, 9.
S. Kitaibelii VII; 10 cm.; pinkish white; E. Al.; 1.
S. laciniata VII; 15 cm.; vermillion; Cal.; 6.
S. legionensis VI-IX; 10 cm.; light rose; Sp.; 1, 4.
S. Lerchenfeldiana VII; 10 cm.; whitish pink; Tr., Ba.; 1.
S. Libanotica VII; 15 cm.; white; Lib.; 1.
S. maritima VI; 5 cm.; white; W. Eur.; 4, 6. (Vars. *fl. pl.* and *rosea.*)
S. (*Heliosperma*) *monachorum* VI-IX; 5 cm.; white; Gr.; 1, 4.
S. montana VII; 15 cm.; whitish rose; Cal.; 1, 6.
S. multicaulis VII; 30 cm.; white; Gr., Or.; 1.
S. occidentalis VII; 40 cm.; purple; Cal.; 1.
S. Orphanidis IV-VI; 10 cm.; white; Mt. Athos; 4, 6.
S. parnassica VII; 20 cm.; white; Gr.; 1.
S. pennsylvanica IV-VI; 15 cm.; bright pink; N. E. Am.; 1, 6.
S. petræa. See *alpestris.*
S. Pharnaceifolia VII; 10 cm.; white; Or.; 1, 4, 6.
S. (*Heliosperma*) *pudibunda* VI; 8 cm.; light rose; E. Al.; 4, 6.
S. pumilio (*Saponaria nana*) V; 3 cm.; bright carmine; E. Al.; 4, 6.
S. pungens VI; 10 cm.; white; Or.; 4.
S. (*Heliosperma*) *pusilla* V; 5 cm.; white; Gr.; 4, 6.
S. (*Heliosperma*) *quadrifida* (*quadridentata*) V; 6 cm.; white; Eur.; 4, 6.
S. Reichenbachiana V; 10 cm.; white; Al.; 1.
S. rupestris V-VII; 10 cm.; pinkish white; Eur.; 4, 6. P.
S. Saxifraga VI; 15 cm.; whitish pink; Eur.; 1, 4.
S. Schafta VII-X; 10 cm.; bright carmine; Ca.; 1, 4.
S. spathulata VI; 5 cm.; rose purple; Ca.; 4.
S. Valesia VII; 10 cm.; reddish; Al.; 1, 4. P.

S. virginica VI; 25 cm.; bright scarlet; N. E. Am.; 5, 6.
S. (*Melandrium*) *Zawadskyi* VII; 8 cm.; pinkish white; Gr., Ba.; 1, 4.

SISYRINCHIUM. Blue-eyed Grass. Small West American Irids with Grass-like foliage abounding on the moist, grassy slopes of Oregon and California. Of easy culture and want only a light, rather moist soil. Seed or division.

S. anceps (*angustifolium*) VI-IX; 10 cm.; violet; W. Am.; 1.
S. bellum VI; 20 cm.; blue; Cal.; 1.
S. Bermudianum VI; 10 cm.; sky blue; W. Am.; 1, 6.
S. californicum VI; 20 cm.; bright yellow; Cal.; 1.
S. filifolium V; 15 cm.; pure white; Falkland Islands; 1, 6.
S. grandiflorum VI-VII; 20 cm.; reddish purple; Cal.; 1, 6.
S. odoratissimum VI; 20 cm.; white; W. Am.; 1.

SMILACINA. False Solomon's Seal. These North American woodland plants are near to Convallaria, very creeping and stoloniferous, with shining gay green foliage and small white flowers. *S. racemosa* is a tall plant reaching 30 cm., with glossy, dark, alternate leaves giving in May and June large panicles of little white stars followed in the fall by bright red berries. *S. stellata,* dwarf, very creeping (invading), blooms in late summer (July to September); *S. trifolia,* 10 cm. high, has white flowers in May. All want moist and cool situation, a peaty ground, and shade. Suckers, division, or seed (slow germ.).

SOBOLEWSKYA *clavata.* Oriental white-flowering Crucifer, 20-30 cm. high, flowering all the summer through; *S. lithophila* is dwarf, dense, and creeping, white flowering. Easy cultivation. Seed or division.

SOLANUM *Sinclairii.* The minutest imaginable of all the Potatoes; the tuber is not bigger than a maize seed; the flowers, white and yellow, are small on a slender 10 cm. high stem, bearing deeply cut leaves. It only comes to life in July, its tubers staying at rest more than eight months without any appearance of life. Introduced to our garden by a friend who brought it from South America, but nobody knows where it really comes from. *S. Dulcamara* is quite a different plant: a climbing shrub of 1 metre with bright violet and golden yellow flowers rather invading.

SOLDANELLA. These real alpine plants are the jewels of the first spring days. They belong to the Primulaceæ, have strongly Anise-scented roots and orbicular leaves; the flowers are drooping, bell-shaped, and fimbriated. They generally bloom in the melting snow and frequently the dull bells may be seen boring through the ice bed. They belong strictly to the alpine regions of Europe. Their culture, easy in a damp climate like the English, is rather difficult for a Continental one. But we may have them flowering here if protected against dry winds by glass bells (cloches) which keep moisture about the opening buds. In some cases a moisture-retentive material, such as moss or cocoanut fibre, can be packed round them to check evaporation; in Floraire we have had good results with the sphagnum culture (see Chapter VI, page 63).

They want a permeable and turfy soil and sunny exposure. Division or seed (slow germ.).

S. alpina III-IV; 8 cm.; violet; Eur.; 3, 9, 10.
S. minima III; 3 cm.; light lilac; E. Al.; 9, 10.
S. montana III-IV; 15 cm.; bright lilac; E. Al., Cp., Py.; 9, 10.
S. pindicola IV; 20 cm.; lavender lilac; Gr.; 9, 10.
S. pusilla III-IV; 5 cm.; pinkish lilac; E. Al.; 10. P.
S. pyrolæfolia III; 5 cm.; violet; E. Al.; 9, 10.
S. villosa; a hairy var. of *montana* from the W. Pyrenees.

Every one of the above-mentioned has some white flowering varieties, and some hybrids have been published: *Ganderi* (*alpina* x *minima*); *hybrida* (*alpina* x *pusilla*); *mædia* (*alpina* x *pusilla*), etc.

SOLIDAGO. Goldenrod. Rather weedy plants which find their place in the wild garden but also occasionally in big rock gardens for lighting some darkening glades in the fall. One species is alpine, and the whole genus belongs to North America and the arctic regions. *S. alpestris* (*S. virgo-aurea* var. *alpestris*) is to be planted on big rockeries on woodland or barren slopes. *S. arctica, brachystachys, nana,* and *pygmæa* are low herbaceous plants and can be recommended. They succeed in every light ground. Division or seed. (Some of the coarse Solidagos, like *reflexa,* afford the best food for bees.)

SONCHUS. See MULGEDIUM.

SPATHYEMA *fœtida.* A big Arad of Northeastern America, a brother of the Skunk Cabbage (see Lysichiton). Fœtid, indeed, but first to flower in the spring. The erect spath precedes the leaves, 15 cm. high, firm and fleshy, brown and greenish yellow, mottled. It likes a damp and porous soil; half shade. Seed (slow germ.).

SPEIRANTHA *convallarioides.* A kind of Lily-of-the-Valley from China, creeping under woodland and yielding scentless little white flowers.

SPHÆRALCEA. See MALVASTRUM.

SPIGELIA *marylandica.* Pink-Root. A marvellously coloured member of the Apocyneæ but very different in appearance from its cousin the Periwinkle. It makes small 30 cm. tuft of dark green leaves resembling *Gentiana Asclepiadea,* with a terminal bunch of scarlet, trumpet-shaped flowers having an edge of yellow. It is late flowering and good for the bog in a sheltered and sunny place. Division or seeds (slow germ.).

SPIRÆA. Important genus of the Rosaceæ which, from a gardening point of view, may be divided into three groups: 1, the shrubs, very numerous and much appreciated by garden makers for use in parks and gardens; 2, the herbaceous; 3, the dwarf saxatiles. We deal only with the two last groups, represented by the Goat's-Beard for the herbaceous and by the dwarf American *S. cæspitosa* for the other. The Astilbes which are nearly allied are noted in their place and now we must present their beautiful cousin, *S. Aruncus* and its brothers. All like wet ground. The Goat's-Beard is a woodland plant. *S. filipendula* and *Ulmaria* are bog plants. Division or seed.

S. Aruncus V; 1 m.; yellowish white; Northern Hemisphere; 1, 2, 3.

S. digitata VI; 1 m.; rose; Si.; 1, 3.

S. filipendula VI; 50 cm.; pink and white; Eur., As.; 1, 3. (A var. *fl. pl.*)

S. Kamtschatica VIII; 1.50 cm.; white; E. As.; 1, 2, 3.

S. Kneiffii; an elegant late-flowering var. of *Aruncus.*

S. lobata, Glory-of-the-Meadow, VI; 80 cm.; rose; N. Am.; 1, 3.

S. palmata VI-VIII; 80 cm.; bright pink; Jap.; 1, 3.

S. Ulmaria V-VII; 60 cm.; pink and white; Eur., Si.; 1, 3. (Some vars. as *flore pleno* and *fol. var.*)

S. venusta V; 30 cm.; carmine; Jap.; 1, 3.

Numerous garden vars. of these are offered in the catalogues.

The dwarf shrubbery kinds for the rockery include:

S. cæspitosa VI; 5 cm.; white; Cal., R. M.; 4, 6.

S. Hendersonii VI; 10 cm.; white; Olympic mount.; 4.

S. (*Erwgyne, Lutkea*) *pectinata* VII; 10 cm.; white; Cal.; 1, 6.

STACHYS. Southern plants belonging in the Labiates, many of them being coarse weeds, but some are exquisite beauties for the rockery. The dwarf and carpeting *S. corsica* is a nice little thing running over the soil or between stones, never exceeding 10 cm. high, with bright green foliage and soft creamy flesh-pink flowers, May to September; it likes a dry, sunny place, well-drained and light loam. Suckers, division, or seed. *S. glutinosa,* also Corsican, is a very low shrubby plant not exceeding 30 cm., with strong balsamic foliage and white flowers; it likes sun and dry soil. Cuttings or seed. *S. lavandulæfolia,* an Oriental 30 cm. high half-shrubby plant, very creeping and stoloniferous; foliage downy velvety, red-purplish flowers all the summer through. Division or seed.

STÆHELINIA. Subshrubby woody Composite, near the Everlastings and coming from the south of Europe. *S. dubia,* 20 cm., with purple-rose and white flowers, grey-green foliage; *S. uniflosculosa,* from Greece, 15 cm. high, with clear pink flowers. Both like a place on a very sunny rock and can be grown in the wall. Seed or cuttings.

STANLEYA *pinnatifida.* A bright yellow-flowered American Crucifer about 50 cm. high with finely cut foliage (V-VII).

STATICE. Sea Lavender. Autumn flowering plants of South Europe maritime rocks and salty marshes of the Old World. All along the railway lines from Marseilles to Barcelona and near the western Atlantic coast the Statices develop into large fields of bluish flowers all the summer through. In the vicinity of Marseilles, the tiny *S. minuta* adorns the rocks washed by the waves and forms dense shrubby little cushions of greyish-green foliage covered with pink-lilac flowers. While in Siberia the big *S. latifolia, altaica,* and *Gmelini* enlighten the meagre soil of the desert; the rocks of the Canaries are extensively adorned by the large bushes of numerous kinds of shrubby species 1-2 m. high, bearing large panicles of sky-blue or lilac flowers. These last, of course, are not hardy with us. All the Statices are very rugged, of easy cultivation, and must be propagated from seed. All want a sunny, dry situation, and light soil.

S. altaica VIII-XI; 50 cm.; lilac blue; Si.; 1.

S. auriculæfolia (*ovalifolia*) IX-X; 15 cm.; pinkish blue; W. Eur.; 1.

S. bellidifolia VII-IX; 15 cm.; blue; S. Eur.; 4, 6.

S. cæsia VIII; 10 cm.; white and blue; Sp.; 4.

S. cordata VI-IX; 20 cm.; violet lilac; Med.; 4, 6.

S. cosyrensis VII; 15 cm.; violet; Cosira Isle; 4.

S. diffusa VI-IX; 20 cm.; rose; Sp.; 4, 6.

S. duriuscula VIII; 30 cm.; pale violet; Med.; 4, 6.

S. Girardiana VIII; 15 cm.; violet; Med.; 4, 6.

S. globulariæfolia IX-XI; 10 cm.; pale violet; S. It.; 4, 6.

S. Gmelini VIII-X; 50 cm.; deep blue; Si.; 1.

S. incana VII; 30 cm.; bright ruby red; Or.; 1, 4.

S. latifolia VIII-XI; 70 cm.; blue; Si.; 1.

S. Limonium VII-X; 15 cm.; bluish lilac; S. Eur.; 1, 4.

S. lychnidifolia VI-XI; 25 cm.; violet; W. Eur.; 1, 4.

S. minuta VI-IX; 5 cm.; violet rose; S. W. Eur.; 4.

S. occidentalis IX; 25 cm.; violet blue; S. W. Eur.; 1, 6.

S. oleæfolia IX-X; 10 cm.; violet blue; S. Eur.; 1, 4.

S. rupicola IX-X; 10 cm.; blue; It.; 1, 4.

S. spathulata VIII-IX; 15 cm.; violet blue; At.; 1, 4.*

S. tatarica VIII-X; 15 cm.; violet blue; Or.; 1.

S. virgata VII-X; 25 cm.; violet; S. Eur.; 4, 6.

The Canarian *S. arborescens brassicæformis, fruticans, hybrida, imbricata, macrophylla, macroptera,* and *Perezi,* which are the endemic feature of these islands, are shrubby, big, and beautiful things, not hardy with us.

STELLARIA. Stitchworts. Woodland creepers near to Arenaria, often used as underwoods or to adorn shady and cool places in rockeries: *S. bulbosa, nemorum,* and *radicans* are stoloniferous invading plants for shade, while *S. graminea* and *Holostea,* with large white flowers, want a rather sunny place and can be put into large rockeries.

STENANTHIUM. Large North American Liliads resembling Veratrum; bulbous and strong, with flowers disposed in panicles and rather stiff bunches. Seed (slow germ.).

S. angustifolium VII; 40 cm.; whitish; N. Am.; 5, 6.
S. occidentale VII; 30 cm.; dark purple; R. M.; 5, 6.
S. robustum VIII; 40 cm.; white; N. Am.; 5, 6.

STERNBERGIA. Yellow Crocus. Amaryllids of South Europe and the Orient, with bright yellow cups flowering generally in late autumn; light, deep soil, sunny position. Seed (slow germ.).

S. colchiciflora X; 5 cm.; light yellow; S. Eur.; 1.
S. Fischeriana IV; 5 cm.; bright yellow; Or.; 1.
S. lutea X-XI; 15 cm.; deep yellow; Med.; 1.
S. macrantha X-XI; 25 cm.; bright yellow; Or.; 1.

STIPA *pennata.* That very curious Grass of Provence, Spain, and the Southern Alps, which also covers the steppes in North Africa and West Asia and adorns so charmingly stony and dry slopes in Valais. The women wear it in their hats and the Valesians who come to the Swiss festivals have bunches in their caps as a patriotic emblem. It is a yellowish-white feather whose awns are 20-25 cm. long, spirally twisted, and everlasting. In our gardens it wants a very dry and meagre soil and a sunny exposure. Its Spanish cousin, *S. gigantea,* has very elegant panicles of long thin awns and makes a beautiful picture hanging from the top of the rocks. Sunny and dry situation. Seed.

STOBÆA (*Berkheya*). Large Thistle-like, thorny Composites 30-40 cm. high, of rather coarse effect, blooming in the late summer, with straw-yellow flowers in *S. membranifolia,* and purplish in *purpurea.* They come from South Africa and want a sunny place in meagre soil. Seed.

STOKESIA *cyanea.* A very nice Composite from North America, 30 cm. high, having, in autumn (VIII-X), large flowers of a clear delicate blue. It likes a porous, deep, well-drained soil and sunny position. Seed or division. A white-flowered form, var. *alba.*

STREPTOPUS. Near to Solomon's Seal, these plants are great lime-haters, and only grow in shade. *S. amplexifolius,* an 80 cm. high plant, from Europe, Asia, and North America, with arching stems bearing white little flowers in VI-VII and red berries in the fall; *S. ajanensis,* from Japan, has yellow flowers; *S. roseus,* from North America, light rose. All want peat or acid soil and moist situation. Seed (slow germ.) or division.

STYLOPHORUM *diphyllum* (*Ohiense*) (*Meconopsis petiolata*). A yellow-flowering Papaverade growing in the woodlands of the Central States of North America. I saw it, once, near St. Louis in a shady wood gloriously framed by the sky-blue flowers of *Mertensia virginica* and *Sanguinaria canadensis! S. lasiocarpum,* from Central China, has a bleeding root like Sanguinaria, and is called Human-Bloodwort. It has yellow flowers too, is

30 cm. high, and wants shade and a moist place. Both can be divided or sown.

SULLIVANTIA *Ohionis.* A little unshowy whitish flowering Saxifrage from North America, which haunts moist and shady places.

SWERTIA. Marsh or bog plants belonging with the Gentians, quite glabrous, with opposite leaves and bearing flowers in loose pyramids or spikes. They are very bitter, like the Gentians, and not brilliant in appearance. But, modest as they are, they offer an interesting feature for the bog or damp corners of the rock garden, where they ask only damp and porous soil in a sunny place. Division or seed (slow germ.).

S. Aucheri VII; 20 cm.; yellow; Ca., Or.; 9, 10.
S. connata VI; 20 cm.; yellow; Si.; 9, 10.
S. lactea V; 15 cm.; light lilac; Ca.; 10.
S. longifolia VI; 20 cm.; yellow; Or.; 3, 10.
S. perennis VI-VII; 25 cm.; dark purple violet; Eur., Si.; 3, 9, 10.
S. punctata VI; 40 cm.; brown yellow; Cp., Tr., Ca.; 9, 10.

SYMPHIANDRA. Oriental Campanulas with elongated bells; liking walls or perpendicular rocks, and flowering generally in late spring. Seed.

S. armena VI; 20 cm.; deep violet; Or.; 4, 6.
S. cretica (*Campanula nutans*) VI; 15 cm.; yellow; Crete; 4, 6.
S. Hoffmannii VII-IX; 30 cm.; cream white; Or.; 1, 4.
S. Lazica VII-IX; 40 cm.; white; Or.; 1, 4.
S. ossetica VI; 15 cm.; blue; Ca.; 4, 6.
S. pendula VI-IX; 40 cm.; yellowish white; Or.; 1, 4.
S. Wanneri. See *Campanula.*

SYMPLOCARPUS. See SPATHYEMA.

SYNTHYRIS. Nice little American Scrophulariads between the Bartschia of our Alps and Veronica. They grow in the Rockies just as do the Bartschia on our Alps, but they are of easier culture, thriving readily in cool humus and half shade. Seed.

S. pinnatifida IV; 20 cm.; dark blue; R. M.; 1, 5, 6.
S. plantaginea V; 20 cm.; pinkish violet; N. W. Am.; 1, 6.
S. reniformis IV; 15 cm.; pale violet; R. M.; 1, 5, 6.
S. rotundifolia III-V; white; Cal.; 4, 6, 10.

TAMUS *communis*. Black Briony. A common climber on hedges and copses, growing only in shady situations; flowers green with bright scarlet berries in autumn.

TANACETUM. Tansy. Strongly aromatic Composites with yellow heads; some dwarf shrubs with silver-grey foliage, from dry and sunny slopes or rocks of the Northern Hemisphere. *T. Balsamita,* Balsam-Tansy, and its var. *boreale,* slightly balsamic, are praised as medicinal herbs; *vulgare* and its American brother *Huronense* (much bigger in all its parts) are large, coarse and herbaceous, 1 m. high, with dark green, finely cut, very aromatic foliage and large rayless heads of bright golden flowers (VII-X); for meagre soils, barren slopes, or the herbaceous border. A var. with very finely cut leaves called *crispum* is grown in gardens for its elegance and strong perfume. Division, suckers, or seed.

The following are grey-leaved dwarf bushes:

T. Pyrethrum argenteum from the Orient; *Herderi* from Turkestan; *Kotschyi* from the Orient. All with yellow flowers (VII-VIII). *T. nivale,* from the Orient, 15 cm. high, is the one white-flowered kind. Cuttings, division, or seed.

TANAKÆA *radicans.* Dwarf Japanese Saxifrage with small greenish flowers for peaty ground and shade. Division or seed.

TCHIHATCHEWIA *isatidea.* Lost, alas, from our gardens for more than 25 years! This is a marvellous Crucifer with pink flowers like *Daphne cneorum major,* and exceedingly fragrant. Mr. Ed. Boissier found it 70 years ago in the mountains of the Euphrates Valley; Mr. Max Leichtlin introduced it into gardens. I have grown it myself several years but, since 1900, it seems to have disappeared from the gardening world. It has a fat rosette of large oblong hairy leaves; the flowers are large and make a dense light rose head. We grew it on a tufa wall, very sunny, and it flowered well but died after fructification. The seeds were eaten by mice, so we lost it entirely, nor can I find it anywhere since. Who will have the opportunity to go into the Euphrates Valley, near Erzinghan, at 2000 m. alt. and find it again in the arid lime walls which it adorns in the early spring?

TELEKIA (*Buphtalmum*) *speciosissima.* A kind of Arnica with hard, leathery, aromatic leaves and deep yellow Daisy-like heads, growing on the East Italian Alps and flowering in May-July. Shady corner, rich leaf mould. Division or seed.

TELEPHIUM *Imperati.* A curious plant belonging to the Illecebræ family, with greenish-white flowers on 8-10 cm. leafy stems; the leaves are glaucous blue, very smooth, thick and oval. It likes granitic rocks and a sunny situation; good for walls. Its Oriental cousin, *T. orientale,* is smaller and dwarfer in all its parts. Seed.

TELLIMA *grandiflora,* belonging to the Heuchera group, is North American. Elegantly lobed and veined leaves and greenish white flowers on 25 cm. bare stem, May and June; 2; shady and moist situation. Seed.

TEUCRIUM. Germander. Low-growing, creeping Labiates, some being aromatic and medicinal herbs from South Europe. They generally prefer barren, sunny rocks or walls; a few only grow in woodlands. Division or seed.

T. aureum V-VIII; 10 cm.; dark yellow; S. Eur.; 1, 4.

T. capitatum VI-VIII; 30 cm.; white; S. Eur.; 4, 6.

T. Chamædrys VII-XI; 15 cm.; deep rose red; Eur., At., Or.; 1, 4; M.

T. filliformis; a slender and very dwarf var. of *pyrenaicum.*

T. flavum VI-VIII; 40 cm.; yellow; S. Eur.; 1.

T. lucidum VI-IX; 40 cm.; bright carmine; S. Eur.; 1, 4.

T. marum VI; 25 cm.; rose; S. Eur.; 4, 6. (Strongly aromatic.)

T. massiliense VII; rose; S. Eur.; 1, 6.

T. montanum VII-IX; 5 cm.; whitish yellow; Eur.; Or.; 1, 4.

T. orientale VII-IX; 25 cm.; lilac blue; Or.; 1, 4.

T. Polium V-VIII; 20 cm.; yellowish; S. Eur.; 1, 4.

T. pyrenaicum VI-IX; 5 cm.; whitish yellow; Py.; 1, 4.

T. Scorodonia VIII; 30 cm.; greenish; Eur. 1, 2.

THALICTRUM. Meadow Rue. These Ranunculads can be divided into two groups, one with showy flowers, the other interesting only by reason of its foliage, which is Maidenhair-Fern-like. All have an abundance of stamens which are quite charming to see, and some have richly coloured flower-envelopes. The tall species are good for woodland, shady corners, or bog. All can be divided and sown (slow germ.). The delicate and beautiful creeping *T. orientale,* which is very rare, never seeds with us but with care can be divided.

T. adiantifolium VII; 15 cm.; greenish; Eur.; 1, 4.
T. alpinum VI; 8 cm.; greenish; N. Hemisph.; 6, 9, 10.
T. anemonoides IV-V; 10 cm.; white; N. Am.; 6. (A var. *fl. pl.* with very double flowers.)
T. angustifolium VII; 1 m.; yellowish; Eur.; 1, 3.
T. aquilegifolium IV-V; 1 m.; lilac or white; Eur., Si.; 1, 2.
T. Chelidonii V; 15 cm.; rose lilac; H.; 6, 9.
T. dasycarpum (*Cornuti*) V; yellow; N. Am.; 1, 2.
T. Delavayi VII-IX; 50 cm.; lilac and cream; Y.; 1, 6.
T. dioicum V; 15 cm.; whitish; N. Am.; 1, 6.
T. dipterocarpum VII-X; 1 m.; light pink and yellow; Ch.; 1. (A fine var. *albiflorum.*)
T. Fendleri VII; 60 cm.; yellowish; R. M.; 1.
T. flavum VIII; 1 m.; yellow; Eur.; 3.
T. fœtidum VI; 20 cm.; greenish; Eur., As.; 1, 4.
T. glaucum VIII; 1 m.; yellow; S. Eur.; 1, 3.
T. majus VII; 40 cm.; yellowish green; E. Al.; 1, 4.
T. minus VI; 15 cm.; reddish green; Eur.; 1, 4.
T. orientale V; 10 cm.; rich rose; Or.; 6.
T. petaloideum (*Baïkalense*) V; 50 cm.; white; Si.; 1.
T. polycarpum VII; 50 cm.; greenish white; R. M.; 1.
T. purpurascens VI; 60 cm.; reddish; N. Am.; 1, 6.

T. saxatile VI; 10 cm.; greenish; Eur.; 1, 4.
T. tuberosum VI; 30 cm.; white; S. Eur.; 1, 6.

THERMOPSIS. False Lupin. Large North American and North Asiatic erect bushy papilionaceous plants, rather invading, good for the border or for the wild and picturesque garden. They are very hardy, from 50 cm. to 1 m. high and bear yellow Lupin-like flowers. *T. Caroliniana, gracilis, macrophylla,* and *montana* are North American; *fabacea* and *lanceolata* are Siberian. All like rich, light loam and an open position. Division or seed.

THLASPI. Low creeping or bushy cruciferous perennials or biennials, growing generally between stones or on barren slopes; they are near to Iberis and like full sun, meagre and gritty soil, or barren slopes. Cuttings or seed.

T. alpestre IV; 10 cm.; white; Eur.; 1, 6.
T. alpinum IV; 15 cm.; white; Al.; 1, 6.
T. bellidifolium IV; 15 cm.; violet; Ba.; 4, 6.
T. brevistylum IV; 20 cm.; white; Co.; 4.
T. cepæfolium IV-VI; 10 cm.; lilac; S. and E. Al.; 4.
T. Kotschyanum V; 15 cm.; white; Ca.; 1, 4.
T. limosellæfolium IV-V; 8 cm.; rose lilac; M. Al.; 8, 10.
T. microphyllum IV; 3 cm.; white; Gr.; 4, 10.
T. montanum IV; 15 cm.; white; Eur.; 1.
T. nevadense V; 10 cm.; white; Sp.; 1, 4.
T. præcox IV; 15 cm.; white; S. Eur.; 1, 4.
T. rotundifolium IV-V; 10 cm.; pinkish lilac; Al., Cp.; 8, 10. L.
T. (*Noccæa*) *stylosa* III; 3 cm.; lilac; S. It.; 4, 6. (Biennial.)
T. violascens IV; 10 cm.; lilac white; Or.; 6.

THYMELÆA. See PASSERINA.

THYMUS. Thyme. Well known as dwarf aromatic Labiates, sometimes medicinal. They come from the Southern countries of Europe and North Asia, and are good subjects for dry and sunny rocks, walks, slopes, and barren places. They like meagre soil and are sought by bees, giving a good fragrance to the honey. Division, cuttings, or seed.

T. azoricus VIII; 10 cm.; rose; Azores; 4, 6.
T. capitatus VII; 15 cm.; rose; S. Eur., At.; 1, 4, 6.
T. carnosus VII; 5 cm.; white; Portugal; 4, 6.
T. Chamædrys VIII; 15 cm.; rose; S. Eur.; 4, 6.
T. citriodorus VII; 20 cm.; lilac; Eur.; 1, 4, 6. (Vars. *aureo-argentea* and *argenteo-marginata.*)
T. coccineus; a bright carmine var. of *Serpyllum.*
T. comosus VII; 8 cm.; lilac; Cp., Tr.; 1, 4, 6.
T. Herba-Barone VII-IX; 20 cm.; violet lilac; Co.; 4, 6.
T. lanuginosus (*pannonicus*); a woolly var. of *Serpyllum.*
T. latinus; a bright pink var. of *Serpyllum.*
T. marginatus VII; 10 cm.; rose; E. Eur.; 1, 6.
T. Marshallianus; a big var. of *Serpyllum.*
T. nitidus VII; 10 cm.; rose; Etna; 4, 6.*
T. Serpyllum VII-XI; 15 cm.; rose; Eur., As., N. Am.; 1, 4. M. (Numerous vars: *latifolius, nummularius, squarrosus,* etc.)
T. villosus VII; 25 cm.; light lilac; Med.; 1.
T. Zygis VIII; 5 cm.; rose; Sp.; 4, 6.

TIARELLA *cordifolia.* Foam-Flower. North American Saxifrage with five-lobed light green leaves and numerous 25-30 cm. high stems ending in a long spike of reddish-greenish white flowers. It likes shady, cool corners and light, dark soils. *T. polyphylla,* from the Himalayas, is smaller and slender; *T. purpurea* is a dark-leaved form of *cordifolia* with pinkish flowers; the *T. unifoliata,* from North America, is much bigger. Seed.

TOFIELDIA *alpina, calyculata glacialis, palustris,* and *rubescens.* Curious small Colchica from cold regions of the Northern Hemisphere. They are rather bog plants, have smooth, narrow, Grass-like foliage and bear their small yellowish-green or reddish flowers on narrow, short, or long spikes. Cool, porous soil, turf mould, bog, etc. Division or seed.

TOLMIÆA *Menziesii.* Small woodland Saxifrageæ with whitish flowers from North America; of same culture as Tiarella.

TOWSENDIA. Dwarf West American Asters flowering in the early spring and bearing large heads resembling small *Carlina acaulis,* or, in some kinds, *Aster alpinus.* They want a dry situation. Seed.

T. grandiflora IV; 10 cm.; white; R. M.; 4, 6.
T. pinetorum IV; 8 cm.; blue and gold; R. M.; 4.
T. sericea (*excapa*) IV; 10 cm.; pink lilac; R. M.; 4, 6.
T. Wilcoxiana IV; 5 cm.; rose lilac; R. M.; 4, 6.

TRACHELIUM *cæruleum.* A nice Campanulad growing on walls in the Mediterranean regions, having very smooth leaves, thin blue flowers in panicles on 40 cm. high stems, VI-IX; 4, 6. Seed. There is a white-flowering var.

TRACHYSTEMON. See BORAGO *orientalis.*

TRAUTTVETTERIA *palmata.* An underwood Ranunculad near to Thalictrum which grows in dense woods of Northwest America and Japan; it has 80 cm. high stems bearing Cimicifuga-like foliage and white flowers in large corymbose cymes; *T. grandis,* from the Rockies, is a larger form. They want a deep and rich leaf mould and shade. Division or seed (slow germ.).

TRICYRTIS. Curious Liliads from East Asia, flowering very late in the summer. They make large tufts of 40-80 cm. high, very densely foliated stems; the flowers are in dense terminal clusters or at the axils of the villose leaves. *T. flava* is yellow; *hirta,* dark purple with white rays and spots; *macropoda,* the best one because flowering August to October, has yellowish flowers with black spots inside. *T. pilosa,* Himalayan, has white and black flowers. All want a porous, damp soil and a sunny, sheltered position; very good for the bog. Division or seed (slow germ.).

TRIENTALIS *europæa.* Dainty, delicate Primulad, growing in two places only in Switzerland, but common in North Europe, where it haunts cool underwoods in the mountain regions. It has creeping roots and rhizomes and covers large spaces of ground where it grows. The slender foliate stem reaches 10 cm. and bears very smooth gay green verticillate leaves, becoming rich red in autumn and 1-3 pure white flowers. In North America it is much larger and bears the name *T. canadensis.* Rich vegetable mould in a cool, well drained, and shady corner—if possible dry through the winter. Division or seed (slow germ.).

TRIFOLIUM. Clover. A few plants of this big group can be admitted in the rock garden; the great mass in fact are weeds. *T. alpinum,* so beautiful on our high pasturages, is of uneasy culture in the plains. That plant presents a curious character: when found on the Pyrenees or in the Spanish Sierras the roots are as sweet as the licorice and are sucked with predilection by the shepherds, while on the whole alpine chain you would try in vain to find any sweetness in it. Seed.

T. alpestre VI; 30 cm.; carmine red; Eur.; 1.

T. alpinum VI; 5 cm.; pink and carmine; Al., Py., Cp., Ba.; 6, 9.

T. atropurpureum; a black-leaved *T. repens* with 4 leaflets.

T. montanum V-VII; 25 cm.; cream white; Eur.; 1.

T. polyphyllum VI; 10 cm.; light yellow; Ca.; 6.

T. uniflorum VI-IX; 5 cm.; pink; S. Eur.; 6.

TRILLIUM. Wood-Lily. One of the wonders of the North American woods, adorning the most shady forests as well as damp meadows with their three-petaled flowers (everything is by three in them, leaves, flowers, and internal organs) and glitter everywhere like stars on the dark ground. In gardens they want a deep, cool and rich porous soil and shade or one-half shade. Seed (slow germ.).

T. acuminatum IV; 20 cm.; greenish white; N. Am.; 3, 5, 9.

T. cernuum IV-V; 15 cm.; rose white; N. Am.; 3, 5, 9.

T. declinatum IV-V; 25 cm.; white; N. Am.; 3, 5, 9.

T. erectum IV-V; 25 cm.; dark brown; N. Am.; 3, 5, 9.

T. erythrocarpum (*undulatum*) V-VI; 25 cm.; white; N. Am.; 3, 5, 9.

T. giganteum V; 30 cm.; deep red; R. M.; 3, 5, 9.

T. grandiflorum III-V; 20 cm.; pure white; N. Am.; 3, 5, 9.
T. nivale V; 10 cm.; white; N. Am.; 3, 5, 9.
T. ovatum V; 8 cm.; white; W. U. S.; 9.
T. petiolatum IV; 20 cm.; white; N. Am.; 3, 5, 9.
T. pusillum IV; 5 cm.; white; N. Am.; 3, 5, 9.
T. recurvatum IV-VI; 25 cm.; dark brown; N. Am.; 3, 5, 9.
T. rivale V; 20 cm.; white and purple; R. M.; 5, 9.
T. sessile IV-V; 20 cm.; green and red; N. Am.; 3, 5, 9.
T. stylosum IV-V; 20 cm.; rose; N. Am.; 5, 9.
T. undulatum. See *erythrocarpum.*

TRIPTILION *spinosum.* Chilian Composite with azure blue heads of flowers which blooms in September and attains 30 cm. Sun and good light; humus soil. Seed.

TRITELEYA *uniflora.* Nice small Liliad from Argentina; close to Garlic (the odour is the same); in early spring it makes dense tufts of pale green foliage and masses of single, relatively large, flat porcelain-blue flowers like large stars shining to the sun and enlightening the garden; *T. violacea* has azure-blue flowers. Sunny, sheltered spot or border and deep, light soil. Division or seed.

TRITOMA (KNIPHOFIA). Rather big things for the rock garden, but their brilliant red and yellow flowers are such a valuable element for a garden that I cannot quite ignore them. All flower in autumn, and want a deep, rich soil, well drained, and a very sunny place. Division or seed (slow germ.). The old type *T. aloides* (Flame-Flower or Red-Hot Poker), has many vars. in the gardens: *corallina, glaucescens, gracilis, grandiflora,* *hybrida Wilson, hyb. solfatare, maxima, serotina,* etc. The half shrubby *T. caulescens* makes large broad bushes 1-1½ m. high of glaucescent foliage with yellow and red flowers; *T. carnosa,* 30 cm. high, with apricot-yellow flowers; *citrina,* light yellow; *comosa,* a dwarf one with yellow flowers; *foliosa,* Abyssinian, 30 cm. high, with bright yellow and red flowers; *macowanii,* 80 cm. high, bright red; *Nelsoni,* a slender one, 60 cm. high, with brilliant scarlet and yellow flowers; *natalensis,* 80 cm. high, bright orange and red; *nobilis,* long and large spike, bright red and orange; *Northiæ,* light yellow; *pallidiflora,* 50 cm. high, with whitish flowers; *pauciflora,* slender plant with pale yellow flowers blooming in the spring (III-V); *præcox,* 60 cm. high, brilliant red and yellow, blooming in May; *pumila* (60 cm.), orange red; *Rooperi,* not exceeding 30 cm., orange red; *Saundersi,* one of the biggest and brightest, very vigorous (2 m. high), with an intense and flaming red flower; *Tuckii,* orange red and dwarf.

TROLLIUS. Globe-Flower. Well-known and much-beloved Ranunculads used in the rock garden as well as to paint damp meadows and bogs. All grow in the wet pasturages of the mountains of the Northern Hemisphere and are the glory of our Swiss open meadows in springtime. In gardens they want a cool and moist ground, rather light and porous. Seed (slow germ.), or division.

T. acaulis IV; 8 cm.; yellow; H.; 1, 3.
T. altaicus IV-V; 20 cm.; bright yellow; Si.; 1, 3.

T. americanus (*laxus*) IV-V; 40 cm.; light yellow; N. Am.; 1, 3.

T. asiaticus IV-V; 30 cm.; gold yellow; Si.; 1, 3.

T. aurantiacus; an orange-yellow hybrid.

T. caucasicus IV-V; 40 cm.; bright yellow; Or.; 1, 3.

T. chinensis IV-V; 80 cm.; deep yellow; Ch.; 1, 3.

T. dahuricus IV-V; 80 cm.; bright yellow; Si.; 1, 3.

T. dschungaricus IV-V; 50 cm.; yellow; Ch.; 1, 3.

T. europæus IV-V; 60 cm.; yellow; Eur.; 1, 3, 7. (Vars. *albiflorus, grandiflorus, napellifolius.*)

T. hybridus; numerous forms beside *aurantiacus* (*Earliest-of-All, Etna, Excelsior, Gold Quill, Lemon Yellow, Orange Globe,* etc.).

T. japonicus V; 20 cm.; yellow; Jap.; 1, 3.

T. Ledebourii VI; 40 cm.; yellow; Si.; 1, 3.

T. lilacinus (*Hegemone lilacina*) V; 10 cm.; lilac blue; Si.; 8, 10.

T. patulus IV-V; 30 m.; pale yellow; Or.; 1, 3.

T. polysepalus IV-V; 50 m.; yellow; Or.; 1, 3.

T. pumilus IV-V; 10 cm.; bright yellow; H.; 1, 3.

T. Yunnanensis V-VI; 30 cm.; deep yellow; Y.; 1, 3.

TROPÆOLUM. Three only of the "Nasturtiums" can be admitted in the rock garden, but they are invading things: *T. patagonicum,* from South America, with purple and yellow flowers; *T. pentaphyllum,* of livid purple; and *polyphyllum,* a very encumbering person, with bright yellow and red flowers on long racemes with bluish-grey leaves. A very well-drained soil and a sheltered position. Seed or suckers.

TROXYMON *grandiflorum* and *alpestre.* American Composites with yellow flowers wanting a moist soil and full sun. Seed or division.

TULIPA. Shall we admit these in the rock garden? They must find a place in the garden, surely, but on a rockery they seem to be a paradox. In the alpine garden or in the border, even in an alpine meadow, the wild types may be planted and every plant lover ought to have a collection in his garden. They want a deep, well-drained, sandy loam and a very sunny disposition.

T. australis (*Celsiana*) IV; 25 cm.; yellow and pink; W. & S. Al.; 1.
T. Aximensis IV; 30 cm.; carmine; Savoy; 1, 7.
T. bœotica IV; 30 cm.; purple and yellow; Gr.; 1.
T. Batalini IV; 15 cm.; lemon yellow; Or.; 1, 6.
T. Biebersteiniana IV; 25 cm.; yellow, brown, and red; Tu.; 1, 6.
T. biflora IV; 20 cm.; white and lilac; Or.; 1, 6.
T. Billietiana IV-V; 50 cm.; yellow and red; Savoy; 1.
T. chrysantha III; 20 cm.; golden yellow; Afghanistan; 1, 6.
T. Clusiana III-V; 25 cm.; bright pink and white; S. Eur.; 1, 4, 7.
T. cretica IV; 5 cm.; pale pink and white; Crete; 6.
T. Didieri IV; 25 cm.; bright pink; S. Eur.; 1.
T. Eichleri (*Juliæ*) III; 50 cm.; pink and purple; S. Eur.; 1, 7.
T. Fosteriana V; 30 cm.; bright vermillion; Bokhara; 1, 6.
T. fragrans IV; 25 cm.; golden yellow; Or.; 1.
T. Gesneriana IV-V; bright red; S. Eur.; 1.
T. Greigii IV-V; 20 cm.; bright scarlet; Tu.; 1, 6.
T. Haageri IV; 15 cm.; blood scarlet; Or.; 1, 6.
T. Kolpakowskyana IV; 20 cm.; bright scarlet; Or.; 1, 6.
T. linifolia IV; 10 cm.; scarlet; Or.; 1.
T. Lownei IV; 10 cm.; bright purple pink; Lib.; 6.
T. Marjoletti IV; 30 cm.; pinkish white; Savoy; 1.
T. Mauriana IV-V; 35 cm.; bright vermillion and yellow; Savoy; 1, 7.

T. Micheliana IV; 20 cm.; red yellow; Or.; 1, 6.
T. montana (*armeniaca*) IV; 10 cm.; reddish pink; Or.; 1, 6.
T. Oculus-solis IV-V; 30 cm.; scarlet; S. Eur.; 1.
T. Orphanidea IV; 25 cm.; purplish yellow; Gr.; 1, 6.
T. Ostrowkyana IV; 25 cm.; bright scarlet; Or.; 1.
T. oxypetala IV-V; 20 cm.; pink; Or.; 1, 6.
T. persica V; 20 cm.; yellow; Or.; 1, 6.
T. planifolia IV; 30 cm.; dark carmine; Savoy; 1, 7.
T. præcox III; 50 cm.; carmine and yellow; Or.; 1.
T. præstans V; 60 cm.; bright red; Bokhara; 1, 6.
T. pulchella IV-V; 40 cm.; rose and purple; Or.; 1, 6.
T. saxatilis V; 25 cm.; bright rose and yellow; Crete; 1, 6.
T. Segusiana IV-V; 40 cm.; dark carmine; Piedmont; 1.
T. suaveolens IV; 30 cm.; scarlet and yellow; South Russia; 6.
T. sylvestris IV; 30 cm.; bright yellow; Eur., Or.; 1, 7.
T. Turcica IV-VI; 40 cm.; bright red; Or.; 1.
T. Turkestanica IV-V; 20 cm.; bright scarlet; Or.; Tu.; 1, 6.
T. undulatifolia IV; 15 cm.; scarlet; Or.; 6.
T. violacea IV-V; 20 cm.; purple; Or.; 1, 6.

TUNICA *Saxifraga.* A tuft of finely leaved 5-10 cm. high stems bearing masses of pale rose flowers near to Arenaria, which haunts the very dry, barren, and gravelly slopes of the south of Europe and of Asia; it gives its masses of small stars from May to November; there are two double vars., one with pink and one with pure white flowers. Good for dry banks, walls, and paved walks on very exposed places. Seed and cuttings.

TUSSILAGO. See PETASITES.

ULEX *europæus.* Gorse. This spiny dark evergreen is beloved of the English flora; an old proverb says: "When the Gorse is out of bloom, kissing's out of season," expressing its continual florescence from January to December. This is the best subject for planting on the dark and barren slopes of the railway lines, on the dunes, and in the meagre and acid soils; it only grows in the granitic countries of West and South Europe and is a joy to the eye. There is a double var., *U. europæus fl. pl.,* and a light yellow one, *U. palescens.* In the garden one may place it on granitic rockery but, in our Continental climate, it must be planted in shade because it cannot resist the first sun rays of spring. *U. Gallii* (*provincialis*) and *U. nanus,* both from S. & W. Eur., are dwarf; the first, with light yellow flowers, is rather tender with us. Peat, shade. Cuttings or seed.

UMBILICUS (Cotyledon). Low Crassulad, succulent, near Sedum and Sempervivum, with the leaves generally concentrated in rosettes and the flowers in small panicles or corymbs. They want sunny rocks, dry places, or walls. Seed, and sometimes division.

U. aizoon VII-IX; 10 cm.; yellow; Or.; 1, 4.
U. chrysanthus VII-VIII; 15 cm.; soft yellow; Or.; 1, 4.
U. ciliolatus VII; 15 cm.; whitish yellow; Or.; 1, 4.
U. elymaiticus VI; 15 cm.; pink; Persia; 4.
U. erectus V-VII; 40 cm.; yellow; Or.; 1, 4.
U. glaber VII; 20 cm.; greenish yellow; Tu.; 4.
U. globulariæfolius VI; 25 cm.; purple; Gr.; 4.
U. horizontalis VIII; 15 cm.; yellow; S. Eur.; 4. P.
U. leucanthus VII; 20 cm.; flesh pink; Si.; 4, 6.
U. libanoticus VII; 20 cm.; purple rose; Or.; 1, 4.
U. Lieveni VIII; 30 cm.; rose lilac; Tu., Persia; 1, 4.
U. oppositifolius VIII; 30 cm.; yellow; Or.; 1, 4.

U. pendulinus (*Cotyledon Umbilicus*) VII; 15 cm.; greenish; Eur.; 4. P.

U. persicus VII; 15 cm.; pink; Persia; 4, 6.

U. Pestalozzæ VI-IX; 10 cm.; pale; pink; Or., Si.; 4, 6.

U. platyphyllus VII-IX; 20 cm.; whitish pink; Or.; 4.

U. Semenowii (*Sedum Semenowii*) VII; 30 cm.; white and pink; Tu.; 1, 4.

U. Sempervivum VII; 10 cm.; light rose; Ca.; 4. (Not *Sedum Sempervivum,* which is another thing.)

U. spinosus VII; 10 cm.; yellowish; Tu.; 1, 4, 6.

U. turkestanicus VII; 20 cm.; white; Tu.; 1, 4.

UNIOLA *latifolia.* Curious Grass from North America making large tufts of 70-80 cm. high leafy stems bearing elegant ovate spikelets quite flat; VIII-IX; 1. Cool or wet corner. Division or seed.

UROSPERMUM *Dalechampii.* The curious Hawkweed of the South producing all summer and in the most bare places, its sulphur-yellow Dandelion-like heads. Likes dry, sunny situations. Seed or division.

UVULARIA. Merrybell. North American plants of the Lily family near to Solomon's Seal, with yellow dropping flowers. Woodland plants, making large, rather invading clumps. Good for the shady places, in rich leaf mould. Division or seed (slow germ.).

U. grandiflora V-VI; 30 cm.; rich yellow; N. Am.; 1, 2.

U. perfoliata (*flava*) V-VI; 25 cm.; yellow; N. Am.; 1, 2.

U. sessilifolia VI; 30 cm.; yellowish; N. Am.; 1, 2. (There is a variegated leaved var. of the last.)

VACCINIUM. Small shrubs forming the Vacciniæ family, allied to the Ericaceæ and represented in Northern regions and on the mountains; they have little globulous flowers and mostly comestible berries, which make delicious jams. Light, rich humus and peat, half sun. Division, cuttings, or seed.

V. Arctostaphylos IV-V; 1 m.; white; Ca.; 5.
V. canadense V; 30 cm.; greenish white; N. Am.; 5.
V. corymbosum V; 2 m.; light pink; N. Am.; 5.
V. crassifolium V; 1 m.; white; N. Am.; 5.
V. (Oxycoccos) macrocarpum VI; 10 cm.; rose; N. Am.; 3, 9, 10.
V. myrsinites V; 50 cm.; rose; N. Am.; 5.
V. Myrtillus, Bilberry, IV; 20 cm.; reddish; North Hemisphere; 5.
V. Oxycoccos, Cranberry, V; 10 cm.; bright pink; North Hemisphere; 3, 9, 10.
V. pennsylvanicum V; 10 cm.; rose; N. Am.; 5.
V. uliginosum, Blueberry, V; 40 cm.; white; Boreal Hemisph.; 3, 5, 9.
V. Vitis-Idæa, Cowberry, V; 20 cm.; rose; North Hemisph.; 3, 5, 9, 10.

VALERIANA. Blessed Herb. Perennial herbs with white or pink flowers whose roots have a strong smell and are used in several cases for perfume and as medicine.[58] Some are big plants growing in damp and shady places and some very dwarf creepers liking sun and stony soil. The famous Spikenard (Nord celtique) is made from the *V. celtica,* a rare herb from the granitic Alps, known from antiquity for its perfume, which pervades the whole plant but especially the root and is still used in the East for perfuming clothes, the bath, and as a disinfectant, etc. Division or seed.

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[58] See H. Correvon, *Plantes et Santé,* sd. ed., pp. 275-277.

V. alliariæfolia VII; 1 m.; white; Ca., Or.; 1, 2.
V. alpestris V-VI; 40 cm.; light rose; Ca., Or.; 1, 6.
V. arizonica V; 30 cm.; rose; N. Am.; 1, 2.
V. asarifolia V; 30 cm.; whitish rose; Gr.; 6.
V. celtica V; 8 cm.; whitish; Al., 5, 6, 9, 10. P.
V. dioica V; 40 cm.; white and pink; Eur., As.; 1, 3.
V. edulis VI; 50 cm.; whitish pink; R. M.; 1.
V. elongata V; 10 cm.; white; E. and S. Al.; 4, 10.
V. globulariæfolia IV-V; 10 cm.; light rose; Py.; 4, 6.
V. longiflora VI-IX; 5 cm.; bright carmine; Sp.; 4, 9.
V. montana V-VIII; 40 cm.; whitish pink; Eur.; 1, 4. L.
V. officinalis VII-X; 1 m.; light rose; Eur.; 1, 2, 3.
V. oligantha VII; 15 cm.; rose; Or.; 4, 9, 10.
V. Phu VII; 80 cm.; light rose; Ca., Or.; 1, 2, 3.
V. pyrenaica V-VII; 80 cm.; whitish pink; Py., Sp.; 1, 2, 3.
V. rotundifolia VI; 20 cm.; rose; Al.; 4, 6.
V. Saliunca IV-V; 5 cm.; white; Al.; 4, 6. L.
V. sambucifolia VI-X; 50 cm.; white and pink; Eur.; 1, 2, 3.
V. saxatilis V; 15 cm.; white; Al.; 4, 6.
V. septentrionalis VII; 40 cm.; white; R. M.; 1, 3.
V. supina V; 5 cm.; white; E. Al.; 4, 6, 9.
V. tripteris V-IX; 20 cm.; white and pink; Eur.; 1, 4. L.
V. tuberosa V; 25 cm.; pink; Eur., As., At.; 4, 6.

RED VALERIAN. See CENTRANTHUS.

VANCOUVERIA. See EPIMEDIUM.

VELLA *spinosa*. Dwarf spinescent, shrubby, almost leafless Crucifer, 20 cm. high, bearing yellow flowers veined with violet. More curious than elegant, this rare plant is to be located on a very sunny and sheltered place in the rockery. It likes chalk and is increased from cuttings or seed. Its cousin, *V. pseudo-Cytisus,* has larger ovate leaves and brilliant yellow flowers. Both are Spanish plants.

VERATRUM *album.* White Hellebore. Common on the pasturages, where it is considered as much a pest for the cattle as is its cousin, the Colchicum. It grows generally in company with the big yellow Gentian and is distinguished by its rougher leaves, which are alternate, whereas in Gentian they are opposite; the plant is rough and coarse and makes large clumps reaching one metre high and bearing dense spikes of greenish-white flowers. *V. Californicum,* although bigger and stiffer, is only an American form of this. *V. nigrum,* still more robust, growing on the Southeastern Alps, has dark brown, almost black flowers, and *V. viride* is a greenish-flowering form of *album.* All want deep rich ground and sun. Seed (slow germ.). They are used as cattle medicine.

VERBASCUM. Mullein. Scrophulariads, well known in garden and in medicine. They are rather big for the rockery but very suitable for the wild and the natural garden, for ornamental or decorative purposes. Not all are perennials, but sow themselves about the plant and, once introduced, especially in poor, meagre, light soil, they thrive for a long time. Adapted to barren places, for enlightening sunny corners, rocky and sandy slopes, and are marvellous for railway declivities. Seed.

V. Chaixii VI; 1 m.; yellow; Py.; 1.
V. decorum VII; 25 cm.; pale yellow; Ba.; 1, 4.

V. hybridum; numerous garden hybrids, pink, yellow, white, brown, mauve, purple, etc.
V. Olympicum VII-IX; 2 m.; bright yellow; Or.; 1.
V. pannosum VII-IX; 80 cm.; bright yellow; Ba.; 1.
V. phlomoides IX; 1 m.; deep yellow; S. and E. Eur.; 1.
V. Phœniceum V-IX; 40 cm.; dark purple; S. Eur., Or.; 1, 4. (Many vars. with pink, purple, bluish, and reddish flowers.)
V. pumilum VII-VIII; 15 cm.; bright yellow and purple; Or.; 1, 4.
V. spinosum VII; 15 cm.; yellow; Crete; 4.

VERBENA *venosa.* Dwarf clumps of rough greyish leaves, stems 30 cm. high, with brilliant purple violet flowers (VI-X); *V. chamædryfolia,* not quite hardy with us, a carpeting plant with brilliant scarlet flowers, is the most showy for the rock garden, but it wants a very sunny and sheltered place. *V. radicans,* Chilian, is one of the best carpeting plants, suitable for paved walks, etc. Not quite hardy with us, yet if covered with moss it stands our winters. Deep purple flowers. Division, cuttings, or seed.

VERONICA. A very large group, very heteromorphic and heteroclyte—some are large herbaceous perennials, others are dwarf creeping plants, others saxatile treasures, or bog plants; those from the Australasian continent are generally shrubby evergreens not all hardy with us. Veronicas are of easy cultivation, some from the highest zones being given No. 10 culture. All like porous soil. Propagated by cuttings, division, or seed.

I. HERBACEOUS or barely suffrutescent at the base:

V. ageria. See *Pæderota.*

V. aleppica VI; 15 cm.; light pink; Or.; 4, 6.

V. Allionii V; 3 cm.; dark blue; W. Al.; 6, 9. (Carpeting.)

V. alpina V; 5 cm.; blue; Eur. mountains; 6, 9, 10.

V. apennina V; 8 cm.; light blue; 3, 6, 9. (Carpeting.)

V. aphylla V; 5 cm.; intense blue; Al.; 6, 9.

V. Aucheri VI; 10 cm.; blue; Ca., Or.; 4, 6.

V. austriaca V-VII; 20 cm.; lilac blue; E. Eur.; 1, 6.

V. Beccabunga V-IX; 40 cm.; blue; Eur., As.; 3. (Invading.)

V. bellioides V; 10 cm.; sky blue; Eur. mountains; 6. P.

V. Biebersteiniana VI; 20 cm.; blue; S. E. Eur.; 1.

V. bombycina V; 5 cm.; pink; Lib.; 4. (Downy white.)

V. Bona-rota. See *Pæderota.*

V. cæspitosa V-VI; 5 cm.; rose; Gr., Or.; 4, 6. (Grey foliage.)

V. canescens VI-IX; 2 cm.; azure blue; N. Z.; 4, 6, 7, 10. (Grey foliage.)

V. carnea; a flesh-coloured *spicata.*

V. caucasica V-IX; 20 cm.; white and rose; Or.; 1.

V. Chamædrys VI-IX; 30 cm.; azure blue; Eur., As.; 1.

V. cinerea V-VII; 15 cm.; white and blue; Or.; 1. (Grey foliage.)

V. commutata V; 10 cm.; bright azure; Sp.; 4, 6.

V. cuneifolia (*dichrus*) V-VII; 10 cm.; blue; Or.; 1.

V. dentata VI; 10 cm.; blue; Swiss Jura; 1.

V. elegans. See *longifolia rosea.*

V. euphrasiifolia VI; 5 cm.; light blue; Persia; 4, 6.*

V. filiformis IV-V; 2 cm.; light azure; Or.; 1, 3. (The best plant for carpeting purposes, paved walks, etc.)

V. fruticulosa VI; 10 cm.; violet lilac; Eur.; 1.

V. gentianoides VI-IX; 40 cm.; pale blue; Ca., Or.; 1. (Vars. *angustifolia, fol. var., glaberrima* and *stenophylla.*)

V. grandis; a tall *longifolia.*

V. incana VI-IX; 40 cm.; intense blue; Or., Si.; 1.

V. incisa VI; 60 cm.; blue; Si.; 1.

V. Kotschyana VI; 10 cm.; rose; Or.; 1.

V. Kurdica VI-VII; 10 cm.; brilliant blue; Or.; 1.

V. laciniata VI-VIII; 30 cm.; blue; Si.; 1.

V. lanuginosa VI; 5 cm.; blue; H.; 1, 4, 6. (Downy white.)

V. latifolia (*urticifolia*) VI-IX; 60 cm.; pink; Eur.; 1, 2.

V. longifolia (*maritima*) VI-IX; 80 cm.; deep blue; Eur., As., N. Am.; 1. (Vars. *alba* and *rosea.*)

V. macrostemon VI; 5 cm.; light blue; Arc. Reg.; 1, 6.

V. melissæfolia VI-VIII; 40 cm.; pale blue; Or.; 1.

V. minuta VI; 3 cm.; bright blue; Ca.; 4, 6.

V. montana VI; 10 cm.; blue violet; Eur.; 2. (Carpeting in shade.)

V. multifida VI; 15 cm.; blue lilac; E. Al.; 1.

V. nivalis V; 5 cm.; lilac blue; E. Al.; 1.

V. nummularia V-VI; 5 cm.; light blue; Py.; 1, 2. (Carpeting.)

V. officinalis VI-IX; 10 cm.; lilac; Eur.; Or.; 1, 2. (Carpeting.)

V. orchidea VII; 30 cm.; blue; E. Al., Ba., Ca.; 1.

V. orientalis V-VII; 20 cm.; rose and white; Or.; 1.

V. paniculata; a var., *longifolia.*

V. pectinata V-VI; 15 cm.; pale blue; Or.; 1.

V. peduncularis VI; 10 cm.; white and pink; Ca.; 1.

V. petræa V-VI; 10 cm.; blue; Or.; 4, 6. (Carpeting.)

V. pinnata VI-VIII; 50 cm.; blue; Si.; 1.

V. Ponæ VI; 15 cm.; lilac rose; Py.; 1, 2.

V. prostrata V; 10 cm.; blue; Eur.; 1, 4. (Carpeting.)

V. repens (*tenella*) V; 5 cm.; rose; Co., Sp.; 6, 9.

V. rupestris VI-VIII; 20 cm.; blue; Eur.; 1. (Its var. *Royal blue* is bright blue.)

V. saturejoides VII; 8 cm.; deep blue; E. Eur., Ba.; 1, 4.

V. saxatilis V-VII; 10 cm.; blue; Eur.; 1, 6. (Vars. *fl. alba* and *fl. rosea.*)

V. serpyllifolia VII; 5 cm.; pale blue; North Hemisph.; 1, 3.

V. sessiliflora VIII; 60 cm.; dark blue; Jap., Si.; 1.

V. spicata VII-X; 20 cm.; deep blue; Eur., As.; 1, 4. (Vars. *fl. alba, carnea,* and *fol. var.*)

V. surculosa VI; 10 cm.; azure blue; Or.; 1, 4. (Downy white.)

V. taurica; a dwarf form of *orientalis.*
V. telephiifolia V-VII; 5 cm.; light azure; Ararat; 6.*
V. Teucrium VI; 40 cm.; intense blue; Eur., As.; 1.
V. Thessalica V; 10 cm.; rose; Gr.; 4, 6.
V. thymifolia VI; 5 cm.; bright blue; Crete; 4, 6. (Downy white.)
V. urticifolia. See *latifolia.*
V. virginica VII-IX; 80 cm.; rose lilac; N. Am.; 1.

II. SHRUBBY VERONICA. These are very numerous and all belong to the Australasian mountains, where they act as do the Rhododendrons in our Alps, retaining the snow and protecting the forests, being a barrier against the devastating forces coming from the heights. These evergreen shrubs with their opposite dark green, bluish, or reddish, thick, shining leaves are subjects of great beauty in the rockery; but some are rather encumbering and few are really hardy in our Continental climate. In West Europe and especially in England, even to the far North of Scotland and Ireland, they succeed marvellously and I have often envied my English friends who may have these beauties. Some have light azure flowers, others pure white and in such a profusion that none of the best shrubs can be compared with them. Below are listed the hardiest, which can be planted on sheltered places, on big rockeries, or in the borders as background, or as a frame for the bright colours of other plants, or even as flowering shrubs. They want, generally, a good loam and a rather hot place and do much better in a damp climate, near the sea and in foggy countries. At Floraire, 400 m. alt., we can grow only five or six of them; while in the botanic garden, three miles from us, near the lake, they have a rich collection out-of-doors which endures every winter! Cuttings or seed. There are numerous vars. and hybrids of the shrubby Veronicas; the catalogue for 1925 of Messrs. Duncan & Davies in New Plymouth (N. Z.) offers one hundred and sixty different ones.

V. amplexicaulis; anomala; Armstrongi; Bidewilli; Buchanani; buxifolia; hardy here; *carnosula* (*pinguæfolia*), hardy here; *Cataractæ* (*Lyalli*), very hardy here; *Chatamica,* low and hardy; *Colensoi; cupressoides* (P), half hardy here; *Darwiniana; decumbens; diosmæfolia* (P); *elliptica* (P); *epacridea* (P); *formosa* (P); *Girdwordiana* (P); *glauco-cærulea,* hardy here; *Haastii* (*monticola*), hardy here; *Hectori* (P); *Hulkeana,* a beauty with light azure flowers; *Kirkii,* hardy here; *Lavaudiana; Lewisii; ligustifolia; linifolia; loganioides; Lycopodioides* (P); *macrantha; macroura; primuloides* (P); *propingua; salicifolia; Salicornioides* (P); *Traversi,* very hardy here; *venusta; vernicosa,* hardy here.[59]

VESICARIA *utriculata.* A saxatile Crucifer with lemon-yellow flowers in large and loose spikes on some 10 cm. high, foliate stems; leaves greyish green. This early spring kind of Cabbage is one of the hardiest of wall plants; it likes very hot and sunny situations and is useful for dry slopes. *V. græca, grandiflora,* and *montana* are seen sometimes in botanical collections, but *V. utriculata* is the best of all. Seed.

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[59] For more details and for descriptions of the whole series of Shrubby Veronicas, see Rob. Okellin, *The Garden,* London, 24, VI, 1893, p. 519.

VICIA *unijuga* (*Orobus lathyroides*). A slender herbaceous plant from Siberia 25 cm. high, with Vetch flowers of the deepest blue (VI); *V. Orobus,* from Europe, is a light bluish purple. Both like good deep mould and half shade. Seed.

VINCA. Periwinkle. For ages used for carpeting dark and shaded places in the garden; they are valuable, too, for the rock garden, where they can be placed in dry and shady corners as well as on very sunny and barren places. They do prefer lime, but are not insistent at all. Division; I never got seeds of them.

V. acutiflora (*mædia*) II-V; 40 cm.; light lilac; Med.; 1, 4.
V. difformis III-V; 50 cm.; pale mauve; Portugal; 1, 4.
V. herbacea VI-VIII; 15 cm.; blue; Cp., Tr., Ba.; 1, 3.
V. Libanotica VI-VIII; 20 cm.; blue; Or.; 1, 4.
V. major III-XI; 80 cm.; blue lilac; S. Eur., At., Or.; 1. (Vars. *albo-marginata, fol. aureo-var., reticulata.*)
V. minor II-V; 10 cm.; blue, violet, or white; Eur.; 1, 2. (Vars. *fl. pl., fol. var.*)

VIOLA. There are two large divisions, the first with large flowers, the Pansies; the second, the true Violets, with small flowers. The alpine and mountainous Violas belong generally with the Pansies, while those of low regions and especially the American ones are Violets. In the United States I found many beautiful Violas, some of which are not yet in gardens; some of the yellow ones (*chrysantha, Hallii, pedunculata, pubescens, rotundifolia, sarmentosa, sempervirens,* etc.) are real beauties.[60] They generally require an open, cool loam. The Pansies are sometimes less easy and especially the gems of the high mountains (*V. alpina, comolia, Valderia*). The most difficult of all is that marvel of the Maritime Alps and Corsica, *V. nummulariæfolia,* the sky-blue Pansy. This is worth every effort, and I keep it as a jewel as desirable as *Eritrichium nanum;* the flowers are very short stemmed, close together, and so numerous that they entirely cover the clear green foliage. It can be grown in some English collections on the moraine. Here we have it on the top of a sunny, exposed wall in pure sphagnum. The American species generally do better than these delicate alpines and some are quite naturalised at Floraire. All the Violas can be reproduced by cuttings, division, or seed. (See color plate facing p. 478.)

I. PANSIES.

V. ætnensis IV; 15 cm.; bluish lilac; S. It.; 6, 10.
V. ætolica IV; 20 cm.; lilac; Or.; 6.
V. alpestris; a perennial form of *tricolor.*
V. alpina IV; 8 cm.; blue spotted purple; E. Al., Cp.; 10.
V. altaica IV-VI; 10 cm.; yellow and purple; Si.; 6. (This is one of the ancestors of our common garden Pansy.)
V. Bertoloni IV; 8 cm.; lavender purple; S. Eur.; 6, 8, 10.

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[60] See *Violets of North America* by E. Brainerd, Vermont Agric. Exp. Bull. 224 (Dec., 1921), giving illustrations of 75 different species and a large list of hybrids and vars. See, too, Prof. Dr. Witrock of Stockholm in *Acta Horti Bergiami,* Band II, No. 7, about Pansies.

V. Bubanii V; 20 cm.; dark violet; Py., Sp.; 6.

V. calcarata III-VI; 10 cm.; dark lilac to white; Eur.; 6.

V. cenisia III-IV; 8 cm.; lilac blue; Al.; 4, 9, 10.

V. Clementiana V; 10 cm.; gold yellow; Or.; 1, 6.

V. Comollia IV; 10 cm.; rose; S. E. Al.; 4, 9, 10.

V. cornuta V-X; 25 cm.; dark lilac; Py., Sp.; 1. (A large number of vars., *alba, grandiflora, lutea, rosea,* etc.)

V. corsica (*insularis*) IV-V; 20 cm.; lilac blue; Co.; 6.

V. crassifolia IV; 15 cm.; purple; Or.; 4, 6, 10.

V. declinata VI; 15 cm.; blue maculate dark purple; E. Al.; 4, 6, 10.

V. dichroa IV-V; 10 cm.; yellow and pale blue; Or.; 4, 6, 10.

V. Dubyana V; 15 cm.; violet blue; E. Al.; 1, 6.

V. Eugeniæ III-VI; 15 cm.; lilac blue; E. Eur.; 6.

V. Florariensis; a hybrid, *rothomagensis* x *cornuta,* with large lilac and violet flowers blooming all the year round.

V. gracilis IV-VIII; 10 cm.; dark violet purple; Ba.; 1, 6. (Some vars. *alba, lutea, grandiflora, Lady Crisp, Lord Nelson,* etc.)

V. heterophylla V-VIII; 15 cm.; violet blue; E. Al.; 4, 6, 10.

V. latisepala VI-IX; 15 cm.; reddish violet; Eur.; 1.

V. lutea V-IX; 10 cm.; bright yellow; Al.; 1. (A var. *grandiflora.*)

V. majellensis from S. Italy is a miniature of *cenisia;* 10.

V. minuta IV-V; 5 cm.; violet; Gr.; 4, 10.

V. Mumbyana V-XI; 20 cm.; bright lilac; At.; 1.

V. nevadensis IV-V; 10 cm.; reddish violet; Sp.; 10.

V. Nicolaï VI; 15 cm.; violet; Ba., Montenegro; 4, 6.

V. nummularifolia V; 8 cm.; blue spotted purple; M. Al., Co.; 10.

V. orphanidis VI; 10 cm.; lilac violet; Gr.; 1, 6.

V. rothomagensis IV-XI; 15 cm.; lilac; France; 1, 4.

V. splendida; a Calabrian form of *V. calcarata.*

V. Sudetica V-X; 20 cm.; bright blue violet; Eur.; 1.

V. Valderia IV-VI; 10 cm.; bright lilac; M. Al.; 4, 6.

V. Zoyzii V; 15 cm.; yellowish white; Al.; 1.

II. True Violets.

V. adunca VI; 10 cm.; light lilac; N. Am.; 1, 6.
V. Allchariensis IV; 15 cm.; dark violet; Ba.; 1, 6.
V. arborescens (*suberosa*) VII; 25 cm.; lilac violet; E. Eur., At.; 4.*
V. arenaria IV; 8 cm.; rose lilac; Bor. Hemisph.; 1, 4. (A var. *rubra*.)
V. atlantica. See *V. Brittoniana.*
V. Beckiana IV-V; 25 cm.; sulphur yellow or lilac; Ba.; 6.
V. biflora III-V; 10 cm.; bright yellow; Eur., N. Am.; 1, 2, 6.
V. blanda IV; 15 cm.; light lilac; N. Am.; 1.
V. Bosniaca IV-X; 10 cm.; pink; Ba.; 1'.
V. Brittoniana (*atlantica*) V.; 20 cm.; violet; N. Am.; 1.
V. cæspitosa VI-VII; 10 cm.; yellow; Sp.; 1, 4, 6.
V. canadensis V; 30 cm.; light lilac; N. Am.; 1.
V. canina IV-VI; 30 cm.; lilac, rose, or white; Eur.; 1, 2.
V. capillaris VI-VII; 15 cm.; light blue; S. Am.; 1, 6.
V. chelmea V; 10 cm.; light lilac; Gr.; 3, 6.
V. chrysantha V-VI; 10 cm.; light lilac; Crete; 3, 10.
V. cucullata V-VI; 30 cm.; violet blue; N. Am.; 1. (Vars. *alba, grandiflora, and striata.*)
V. declivis II-IV; 20 cm.; light blue; Savoy; 1.
V. delphinantha; a remarkable shrubby plant from Mt. Athos with lilac-white flowers and very long spurs; a very strange, rare, and difficult plant; 4.
V. delphinifolia V; 20 cm.; violet; N. Am.; 1.
V. elatior VI-IX; 40 cm.; lilac; Eur.; 1, 3.
V. Floridana V; 10 cm.; light rose; N. Am.; 3, 10.
V. fragrans IV; 15 cm.; violet and yellow; Crete; 6.
V. glabella V; 20 cm.; bright yellow; R. M.; 1', 6.
V. Hallii V-VII; 15 cm.; yellow violet; Cal.; 4, 6, 10.
V. hastata IV-V; 10 cm.; yellow; N. Am.; 1, 6.
V. Hovelli V; 10 cm.; blue; R. M.; 1, 6.
V. hederacea (*Erpetion reniforme*) VI-IX; 8 cm.; blue and white; N. Z.; 6.*

V. hirta III-VI; 10 cm.; lilac violet; Eur.; 1, 7.
V. Jooi V-VI; 10 cm.; rose lilac; Cp., Tr.; 1, 6.
V. labradorica IV; 10 cm.; lilac; B. R.; 6, 10.
V. lanceolata VI; 10 cm.; white; N. Am.; 1.
V. lobata V-VII; 30 cm.; bright yellow and brown; Cal.; 1, 2.
V. macedonica; a dwarf form of *tricolor.*
V. magellanica IV; 15 cm.; yellow; S. Am.; 6, 10.
V. mirabilis IV-V; 20 cm.; blue lilac; Eur.; 1, 2.
V. missouriensis V-VI; 20 cm.; lilac and purple; N. Am.; 1.
V. montana VI; 30 cm.; white; Eur., Si.; 1.
V. multifida V; 20 cm.; bright lilac; N. Am.; 1.
V. nephrophylla V; 15 cm.; rich purple; N. Am.; 6.
V. Nuttallii IV-VI; 15 cm.; violet and yellow; R. M.; 1, 6.
V. occidentalis V; 20 cm.; white and purple; R. M.; 6.
V. ocellata III-VI; 15 cm.; white and violet; Cal.; 2, 6.
V. odorata; the common Violet, with a great many varieties.
V. orbiculata III-VI; 10 cm.; rich yellow; R. M.; 6, 10.
V. orientalis V-VI; 15 cm.; rich yellow; Si.; 6.
V. palmata V-IX; 25 cm.; reddish violet; N. Am.; 1.
V. palustris VI-IX; 8 cm.; light lilac; Eur.; 3, 10.
V. papilionacea IV-VI; 25 cm.; rich lilac; N. E. Am.; 1. (A var. *confederata,* dwarfer with bigger and pinker flowers.)
V. Patrini V; 10 cm.; light lilac; Ch., Jap.; 1.
V. pedata IV-VI; 8 cm.; rich lilac; N. Am.; 6. (A var. *bicolor,* lilac and dark purple.)
V. pedatifida VI; 20 cm.; dark violet; R. M.; 1, 6.
V. pedunculata IV-VI; 25 cm.; rich yellow and brown; Cal.; 6.
V. pinnata V-VI; 8 cm.; lilac and violet; Al.; 6, 10.
V. pratensis V; 10 cm.; lilac; Eur.; 1, 7.
V. primulæfolia V; 10 cm.; white and violet; N. Am.; 1.
V. prionantha V-VI; 10 cm.; dark violet; Ch.; 1, 6.
V. pubescens V; 20 cm.; yellow and violet; N. Am.; 1, 6.
V. purpurea IV-V; 10 cm.; yellow and dark purple; Cal.; 6.
V. pyrolæfolia III; 10 cm.; yellow; S. Am.; 1, 6.
V. Riviniana IV; 10 cm.; lilac blue; Eur.; 1.

V. rostrata VI; 15 cm.; violet; N. Am.; 1.
V. rotundifolia IV-V; 10 cm.; yellow; N. Am.; 6.
V. sagittata V; 25 cm.; lilac; N. Am.; 1.
V. Selkirkii (*Kamtschatica*) VI; 10 cm.; pale lilac; Si. 1.
V. septentrionalis V; 15 cm.; lilac violet; N. Am.; 6.
V. sororia IV-V; 20 cm.; purple; N. Am.; 3, 6.
V. stagnina VI; 8 cm.; light lilac; Eur.; 3, 9.
V. Stoneana IV-V; 15 cm.; dark violet; N. Am.; 6.
V. striata IV-V; 25 cm.; white and purple; N. Am.; 1.
V. suavis IV; 10 cm.; pale blue; Si.; 1.
V. sulfurea (*Vilmoriniana*); a sulphur yellow *odorata.*
V. sylvestris VI; 20 cm.; violet; Eur.; 1, 2.
V. Thomasiana VI; 10 cm.; reddish violet; S. Eur.; 1.
V. uliginosa V; 10 cm.; lilac violet; Eur.; 3, 9.
V. uniflora V; 10 cm.; bright yellow; Si.; 2, 6, 10.
V. vallicola IV-VI; 15 cm.; yellow and purple; N. Am.; 1, 6.
V. Walteri IV; 15 cm.; purple; N. Am.; 1, 6.
V. Wiedmannii VI; 8 cm.; light lilac; Or.; 3, 9, 10.

VITTADENIA *triloba* (*Erigeron mucronatus*). An exceedingly rich flowering and decorative little Composite from Mexico, which has been naturalised in the walls and rocks of North Italy and of the southern parts of Switzerland. The plant is 10-25 cm. high, thin and slender, and bears innumerable little Daisies, pink and reddish, all the summer through to the end of November. It is one of the best plants for walls, sunny slopes, meagre soils, and rockeries; it is even good for borders and paved walks. *V. australis,* from Australasia, has pure white flowers and is tender.

WAHLENBERGIA. A campanulaceous genus composed of two quite different groups, the first being European and saxatile (see *Edrayanthus*), and the second antarctic and Australasian. Mr. N. E. Brown has published a series of notes on the last and it is unnecessary to develop the whole list here, a large number being annuals and others valueless for gardens.[61] Wahlenbergias, which can be recommended for rockeries, are the following; all are rather tender and lime-hating; they want moist peat and sun. Division or seed.

W. albo-marginata V-IX; 15 cm.; light blue; N. Z.; 8, 9, 10.
W. cartilaginea VI-VII; 10 cm.; white; N. Z.; 8, 9, 10.
W. saxicola VII-IX; 15 cm.; pale blue; Van Diemen's Land; 8, 10.
W. vincæflora VII-VIII; 30 cm.; light blue; N. Z.; 8, 9.
W. hederacea. See *Campanula hederacea.*

WALDHEIMIA *tridactylites.* A little Composite near Townsendia which grows in Central Asia; dwarf and cæspitose, flowers rose (V-VI); difficult cultivation; 9, 10.

WALDSTEINIA. Interesting Rosales near Geum, with yellow flowers forming loose clumps of light green foliage. Division or seed.

W. geoides IV-V; 1·0 cm.; rich yellow; Cp., Tr.; 1.
W. lobata V; 15 cm.; yellow; N. Am.; 1.
W. trifolia V; 10 cm.; yellow; E. Eur.; 1.

WELDENIA *candida.* A Mexican, rare Commelineæ with light rose flowers and succulent leaves in rosettes of difficult cultivation; 9, 10.*.

WULFENIA. Dense and dwarf tufts with Horminium-like appearance and nice blue flowers disposed on dense nodding spikes. Scrophularineæ. Peat and leaf mould in a well drained and shady or half shady part of the rockery. Division or seed.

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[61] See N. E. Brown in *Gard. Chronicle,* London, 8, 15 and 22 Nov., 1913.

W. Amherstiana VI; 15 cm.; purplish; H.; 1, 4, 6. P.
W. Baldaccii VI; 10 cm.; blue; Albania; 8.
W. carinthiaca VI; 20 cm.; deep blue; E. Al.; 2, 4, 6. P. (A var. *alba.*)
W. orientalis VI; 20 cm.; deep blue; Or.; 6.
W. Wallichii VII; 10 cm.; lilac blue; H.; 8, 9.

WYETHIA *angustifolia* and *mollis.* Yellow-flowered Composites from Northwest America, suggesting dwarf, large-flowered Sunflowers. Sunny places on big rockeries. Seed.

XATARTIA *scabra.* A curious Umbellifer, 20 cm. high, with triangular dark green leaves and yellow flowers; it grows only on the limestone *pierriers* in the Val d'Eyne in the E. Pyr., 4, 10. Seed.

XEROPHYLLUM *tenax* (*X. asphodeloides*). Squaw-Grass, Bear-Grass, Elk-Grassete. One of the features of the Rockies, of the barren slopes in California, Oregon, and Washington State, etc., where they are an element of beauty calling to mind the vast European fields of Asphodel. The stems may attain 1 to 2 m. high, bearing a dense raceme (30 cm. long) of white flowers. I am sorry to be obliged to confess my total lack of success in attempts to acclimatise the plant at Floraire. I have seen it in many gardens in England, where it thrives all right on dry, well-drained, sandy soil, very sunny. It is reproduced from seed (slow germ.). The fibres of the leaves are employed by the Indians for making garments and for baskets which they offer to the passengers at the railway stations.

YUCCA. Spanish Bayonet. Rather stiff and coarse subjects for the rock garden, but some of them could be used in very dry and hot places. *Y. angustifolia,* which covers barren slopes in Colorado and Oregon all along the railway lines, is a charming thing. All Yuccas come easily from seed.

ZAUSCHNERIA *californica.* Californian Fuchsia. The last smile of the summer's bloom, coming at the same time as the last Chrysanthemum and the Michaelmas Daisies. They are the splendour of Floraire in September-November and, as they thrive in any good soil and want only full sun (they drink up sunshine like the grapes, say our gardeners), they do very well on our south-looking ground. The scarlet red of these masses of flowers is quite exceptional and some have very elegant flowers. Division or seed. The old type, *Z. californica,* makes large, dense bushes of greyish-green foliage, while *Z. arizonica* has much larger flowers resembling those of the cultivated Fuchsia, rather erect than nodding; *Z. canescens, latifolia, mexicana,* and *microphylla* are all varieties of the type, some more brilliant, some with larger or smaller leaves.

ZEPHYRANTHES *candida.* La Plata Crocus. Remarkable Amaryllid from South America, appearing in September and October, and making nice masses of beautiful pure white Crocus flowers framed with the graceful dark Grass-like foliage.

It is hardy here but must be protected against humidity; *Z. Athamasco* from Virginia, cream white; *Z. carinata* and *rosea,* both flesh rose, are tender and must be protected through the winter.

ZOZEMIA *absinthiifolia.* Has very finely cut leaves. An Umbellifer with white flowers, that we got some time ago from the Caucasus.

ZWACKYA *aurea.* A yellow-flowered Lithospermum from the Balkans with very thick rootstock, rough leaves, and golden bloom. It wants deep, drained soil and sunny exposition. Seed.

ZYGADENUS. Greenish white-flowered Liliads near Veratrum; growing abundantly all about Northwest America on sandy banks, wet meadows, or in the deserts. Peat, bog, or sandy soil. Division or seed (slow germ.).

Z. angustifolius V; 40 cm.; pinkish white; N. Am.; 5, 9.
Z. Fremontii VI; 30 cm.; cream white; Cal.; 5, 9.
Z. glaberrimus VII; 80 cm.; green white; N. Am.; 6, 9.
Z. glaucus VII; 60 cm.; green white; N. Am.; 5, 9.
Z. Nuttallii VI; 40 cm.; white; N. Am.; 1, 5, 9.

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